

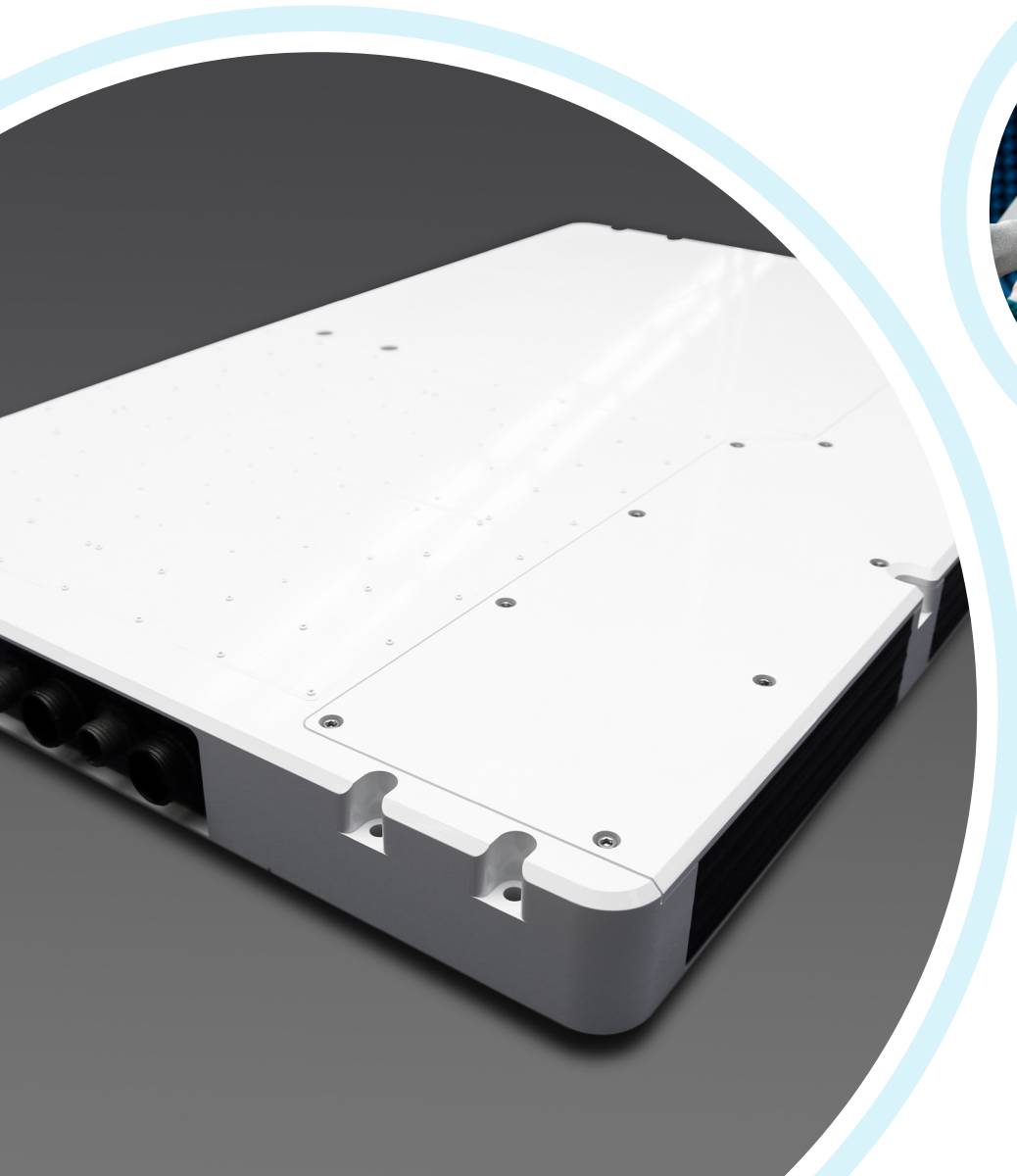
# Ka-BAND SATCOM



## Phased Array Terminals

Ball Aerospace's industry-leading line of electronically steerable antennas (ESAs) provide reliable, secure and high-speed communications across networks, frequencies and platforms. Our antenna solutions deliver unmatched flexibility to meet any use case, enabling fully customizable and affordable ESAs in Ka frequency bands for government, military and commercial markets.

ESA technology will transform how we connect and share information across the world. With our scale, experience and resources along with our global manufacturing partners, we are bringing the promise of ESA technology to the market today.



GO BEYOND WITH BALL.®

## Architecture Overview

Ball's electronically steered Ka-Band phased array antennas feature our innovative subarray antenna architecture. The subarray is an environmentally-sealed ESA building block. A terminal's transmit and receive antenna sizes are optimized by tiling multiple subarrays together to meet requirements. Our subarrays are fully electronic with no unique materials or complex assembly processes. This allows the antennas to be assembled in volume, minimizing cost. The subarrays support both military and commercial use cases, including in-flight connectivity (IFC), communications on the move (COTM) and enterprise.

### Durable & Dependable

- Subarrays are an environmentally-sealed assembly, protecting all electronics

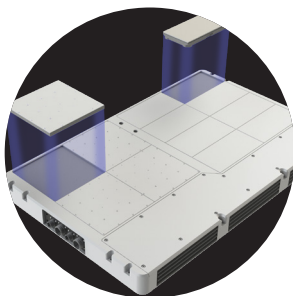
### Affordable

- Designed for existing high-volume manufacturing processes
- Use highly-integrated commercial semiconductor devices and circuit boards
- Designed with integrated radome to reduce system cost and improve performance

### Interoperable / Future-Proof

- Antenna terminals are network and modem agnostic to support access to multiple networks
- ESA fast beam update rates easily support LEO satellite tracking
- Software-defined antenna enables our architecture to meet the network needs of today and tomorrow

COTM  
Terminal:  
4Tx + 8Rx  
Subarrays



## ESA: Proven & Ready

Ball has assembled and tested multiple ESA terminals, demonstrating the performance and scalability of the subarray design. Terminals have been demonstrated on geostationary orbit (GEO) and low-Earth orbit (LEO) networks, showcasing the flexibility and robust communication capabilities of our terminals to maintain links under highly dynamic maneuvers.

Ball ESA terminals are ready today to meet your SATCOM needs. The company is actively ramping up our production of subarrays. We offer a flexible partnership model that capitalizes on each organizations' expertise, whether delivering full terminal solutions or just the antenna.

### ESA CAPABILITIES

|                         |   |
|-------------------------|---|
| <b>Frequency</b>        | Transmit: 27.5 – 31.0 GHz<br>Receive: 17.7 – 21.2 GHz |
| <b>Polarization</b>     | RHCP/LHCP (software switchable)                       |
| <b>Axial Ratio</b>      | < 2.0 dB (software controlled)                        |
| <b>Coverage</b>         | Azimuth: 360°<br>Elevation: 10° to 90°                |
| <b>Beam Update Rate</b> | < 1ms (any position, any polarization)                |
| <b>Interfaces</b>       | Open AMIP / Custom                                    |
| <b>Dual Beam</b>        | Receive capable                                       |

| ANTENNA CONFIGURATION (SUBARRAYS) |    | ESTIMATE ANTENNA PERFORMANCE |            | APERTURE SIZE |         | WEIGHT (SUBARRAYS ONLY) |
|-----------------------------------|----|------------------------------|------------|---------------|---------|-------------------------|
| Tx                                | Rx | EIRP (dBW)                   | G/T (dB/K) | Tx (in)       | Rx (in) | (lbs)                   |
| 1                                 | 2  | 41                           | 8          | 8×8           | 9×9     | 8                       |
| 2                                 | 4  | 47                           | 11         | 16×8          | 18×9    | 15                      |
| 4                                 | 8  | 53                           | 14         | 16×16         | 18×18   | 30                      |
| 4                                 | 12 | 53                           | 15.8       | 16×16         | 18×27   | 40                      |

