Norsat International Inc.

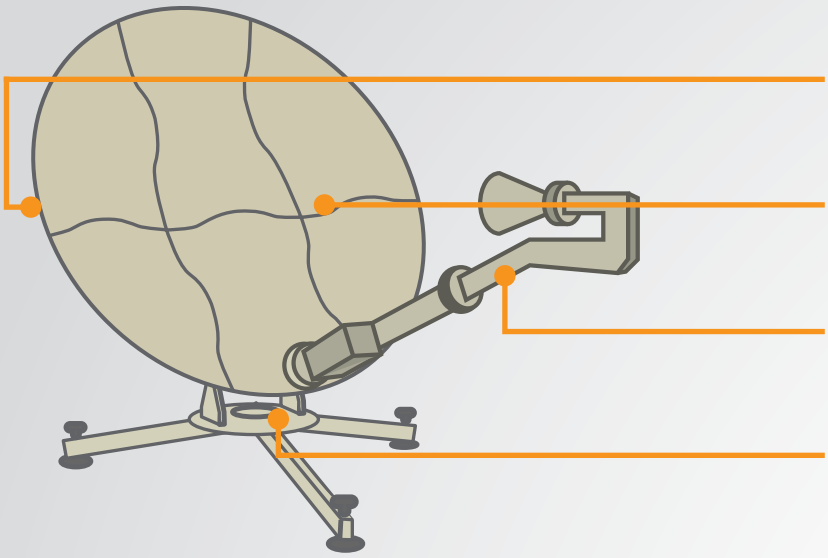
ROVER™

FLEXIBLE.
PORTABLE.
RELIABLE.

The ROVER™ is an ultra-lightweight fly-away satellite terminal with unsurpassed reliability, advanced assisted-acquire technology, and a flexible deployment platform. Available in both 1.0 and 1.2m antenna sizes, the ROVER's components can be tightly integrated for rapid deployment or separated into indoor and outdoor units for safe operation in dangerous terrain or situations. With IATA compliant packaging and a tool-free assembly process, the ROVER is easy to transport and operate, with military grade durability you can rely on wherever your mission takes you.

WHY CHOOSE THE NORSAT ROVER™?

Advanced assisted acquire technology	LinkControl's intuitive user interface guides users through the satellite acquisition process
Modular Architecture	Components are field serviceable for easy maintenance
Easy tool free assembly	Rapidly assemble & deploy without tools in under 15 min
Flexible Indoor/Outdoor unit deployment	Safely deploy the ROVER in dangerous terrain, or weather
Multi-band capability	Ku, X, and Ka band kits available – field swappable in under 10 min
System integration	Software integration and control supports widest variety of components
Built in trouble shooting	Visible and audible alarms guide user through problem resolution
Military Grade	Platforms have been tested to meet military specifications
Ultra lightweight packaging	IATA compliant hard cases or backpack options available



COMPONENTS

SSPA
RF package can be field swapped to quickly change the frequency bands and powers.

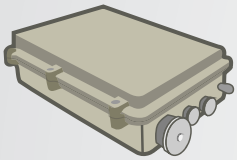
6-Segment Carbon Fibre Antenna
Lightweight, portable and easy to assemble. Available in 1.0 or 1.2m.

2-Segment Boom Arm
Fits into compact packaging. Patented integrated filters are included for X-band systems.

IIIC (Interface/Indicator/Inclinometer/Compass)
Conveniently houses a digital Compass, digital Inclinometre and a Receive Signal Strength Indicator (RSSI)

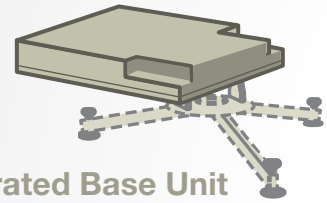
INTEGRATION OPTIONS

The ROVER system is available in a variety of configurations, giving you the flexibility to choose the best fit for your your existing equipment, technical expertise and deployment requirements.



Satellite Acquisition Assistant
The Satellite Acquisition Assistant (SAA) is a satellite pointing tool kit available with the ROVER as a standalone unit in a rugged enclosure. The SAA includes spectrum analyzer, integrated GPS, inclinometer, compass, narrow band power meter, DVB/S(2) receiver, and LinkControl Software.

- Cost effective solution for experienced satellite technicians
- Ideal for redundant terminal solutions
- May be used to align other terminals



Integrated Base Unit
The SAA, power supply and a rugged satellite modem can be delivered in an outdoor unit, fully integrated into the ROVER outdoor equipment.

- All weather deployment - Electronics stored in outdoor rated enclosures (IP65)
- Ultra-light weight for easy transportation
- Integration ensures the most rapid set up and deployment

Rack Mount System
The ROVER can be supplied with an integrated rack mount solution in a variety of rack sizes. Rack mounted systems include a Compact Indoor Unit, SAA, laptop, power supply & space for any number of modems or encoders.

- Maximum flexibility- integrate nearly any component, including high power BUCs
- Rugged- rack units are supplied in ruggedized cases for transport and storage

Basic: Already have your own pointing tools? ROVER can be supplied without any components for the most cost effective solution.

SPECS

	X-Band (60W BUC*)		Ku-Band (40W BUC*)		Ka-Band (4W BUC*)	
	1.0m antenna	**1.2m antenna**	**1.0m antenna**	**1.2m antenna**	**1.0m antenna**	**1.2m antenna**
G/T	14.7 dB/K	17.0 dB/K	19.5 dB/K	20.2 dB/K	21.5 dB/K	20.8 dB/K
EIRP*	51.5 dBW	55.1 dBW	56.1 dBW	57.6 dBW	53.5 dBW	55.2 dBW
Tx Gain	>36.1 dBi	>38.3 dBi	>41.5 dBi	>43.0 dBi (mid band)	>48.0 dBi	>49.7 dBi (mid band)
Rx Gain	>36.0 dBi	>37.6 dBi	>40.0 dBi	>41.0 dBi (mid band)	>44.0 dBi	>46.0 dBi (mid band)
Polarization	Circular RHCP/LHCP or LHCP/RHCP		Linear Cross-Pol		Circular / Linear RHCP/LHCP or LHCP/RHCP	
Cross pol isolation	N/A		>35.0 dB within 1 dB contour		N/A	
Axial Ratio	<1.2 dB in Tx Band		N/A		<1.0 dB in Tx band	
Elevation adj	5° to 85°, Manual with fine adjust					
Azimuth adj	±300, Manual with fine adjust					
Transmit frequency	7.9 - 8.4 GHz		13.75 GHz - 14.5 GHz		30 - 31 GHz (military)	
Receive frequency	7.25 - 7.75 GHz		10.95 - 12.75 GHz		18.2 - 21.2 GHz	
Input frequency	950 - 1450 MHz		950 - 1700 MHz		950 - 1950 MHz	
Operating Temp	-30°C to +55°C, meets MIL-STD- 810G					
Rainfall	15 mm/h Operational, 30 mm/h Survival, meets MIL-STD- 810G					
Windspeed	60 km/h Operational, 100 km/h Survival					

* Other power options available

LinkControl Software

Included with every ROVER™ system, LinkControl™ software is the industry's most intuitive and powerful suite of satellite pointing tools. With an easy-to-use GUI, LinkControl guides the user through the satellite acquisition process and seamlessly integrates the various hardware components. Users have full control of all integrated components including SSPA, LNB, modem, or encoder modulators. Through user configured profiles and a customizable satellite almanac, LinkControl enables users to plan operations, rapidly deploy systems and conduct remote diagnostics. Features include:

- Assisted acquire technology with an easy step-by-step interface
- Component auto-detection for easy modem or bandwidth switching
- Remote access from anywhere in the world via TCP/IP
- Built-in troubleshooting and resolution system
- Closed loop power control to account for environmental variation
- User configured LinkProfiles to store deployment data including location, satellite, Modem/encoder data, hardware configuration, LNB and polarization detail

LinkControl in action

PORTABLE AND RELIABLE.

Currently deployed around the world for a variety of military and commercial applications, the ROVER™ is field proven and reliable for mission critical operations. The ROVER platform has been tested to meet military specifications and features a rugged design ideal for use in all terrains and climates. The ROVER's light weight carbon fibre antenna and IATA compliant packaging ensure the terminal is airline transportable, so you can rely on the ROVER to just work, wherever your mission takes you.

FLEXIBLE.

The ROVER's flexible platform is easily configured to exactly meet the requirements of your deployment. The various components can be integrated into a compact base unit for easy transportation and deployment, or separated into Indoor and Outdoor units to keep electronics and personnel safe while operating in dangerous terrain or inclement weather. A compact indoor unit (CIDU) completely integrates laptop controllers and pointing tools, and a Satellite Acquisition Assistant (SAA) provides everything needed to point, peak and acquire a satellite. Available with X, Ku and Ka band kits that can be field swapped in less than 10 minutes, and power options up to 200W, the ROVER provides the most flexible satellite terminal platform available today.

Antenna	X-Band	Ku-Band	Ka-Band
Antenna Platform	Elevation over Azimuth Mounted on tripod	Elevation over Azimuth Mounted on Tripod	Elevation over Azimuth Mounted on Tripod

Transmit	X-Band	Ku-Band	Ka-Band
Reference Signal Frequency	external 10 MHz -5 to +5 dBm (supplied by Base Unit)	external 10 MHz -5 to +5 dBm (supplied by Base Unit)	external 10 MHz -5 to +5 dBm (supplied by Base Unit)
Rated Power (1dB C.P.)	60 W (other options available)	40 W (other options available)	4 W (other options available)
Power Control	0.1 dB res, 1 dB accuracy modem dependent	0.1 dB res, 1 dB accuracy modem dependent	0.1 dB res, 0.6 dB accuracy modem dependent
Max. SSG Variation over any narrow band	±1 dB per 54 MHz	±1 dB per 54 MHz	0.3 dB in 36 MHz band
Spectral Regrowth at rated pwr.	-26 dBc	-26 dBc	-26 dBc

Receive	X-Band	Ku-Band	Ka-Band
LNB Noise Figure (typical)	0.7 dB	0.8 dB	1.3 dB
LO Stability Maximum (over temp)	±10 KHz or ext. ref.	±5 KHz or ext. ref.	±40 kHz or ext. ref.
Phase noise (SSB maximum) (SSB maximum)	-75 dBc/Hz at 1 kHz -85 dBc/Hz at 10 kHz -95 dBc/Hz at 100 kHz	-75 dBc/Hz at 1 kHz -80 dBc/Hz at 10 kHz -95 dBc/Hz at 100 kHz	-75 dBc/Hz at 1 kHz -80 dBc/Hz at 10 kHz - dBc/Hz at 100 kHz
Output P1dB	10 dBm	7 dBm	7 dBm

Modem and Encoder/Modulator Options

The ROVER is compatible with a variety of modems and encorders, including those made by the following manufacturers:

Comtech

iDirect

Hughes

Radyne

Norsat MPEG 2/4 HD/SD Encoders Available

Satellite Acquisition Assistant (SAA) Toolkit Features

Spectrum analyzer. Advanced Sat Comm professional tool allowing for enhanced precision during pointing and diagnostics.

Integrated GPS, inclinometer, and compass. Provides all the bearing information needed to accurately find and point the terminal

Narrow band power meter. Power level reading for quick check satellite indication

DVB S/S2 receiver. Positive lock for exact satellite acquisition confirmation.

LinkControl Software

Rackmount or Compact Indoor Unit (CIDU) Features

Form Factor	2RU 19" rack chassis
Power Supply	up to 100W @ 24V (for IDU)
	up to 400W @ 48V (for SSPA power supply)
Power Requirements	600W 110/220V AC 50/60Hz
Size	41 x 56 x 24 cm
Weight	22 kg (est.)
System Controller	Panasonic CF-19 Toughbook

Completely integrated SAA Module with all SAA tools

Windows XP, Windows 7, Mac OSX, Norsat LinkControl software

User selectable Modem integrated with LinkControl Software

Integrated Base Unit Features

The Base Unit is delivered in an outdoor rated enclosure, completely integrated into the ROVER. The Base Unit is complete with all of the following:

Satellite Acquisition Assistant (components listed above)
Power supply
Rugged satellite modem

Environmental

Temperature		
Operational	-30°C to +55°C	MIL-STD-810G
Survival	-40 to +70°C	MIL-STD-810G
Rainfall		
Operational	15 mm/h	MIL-STD-810G
Survival	30 mm/h	MIL-STD-810G
Storage Temp	-40°C to +70°C	
Windspeed		
Operational	60 km/h	
Survival	100 km/h	
Humidity	5-95% non-condensing	MIL-STD-810G
Vibration		MIL-STD-810G
Loose Cargo Vibration		MIL-STD-810G
Transit Drop		MIL-STD-810G
Blowing Dust & Sand		MIL-STD-810G
Blowing wind & rain		MIL-STD-810G
Random vibration		MIL-STD-810G
Shock		MIL-STD-810G
Drop & topple		MIL-STD-810G
Free fall		MIL-STD-810G
Salt mist		MIL-STD-810G

Power Supply

Prime Power	110/220 V AC (50 / 60 Hz)
Consumption	Varies with BUC options
Power Supply	Can be supplied with 400W, 600W & 1000W power supply depending on BUC options

Packaging

Hard packs, soft pack and backpack options available. Most system configurations are available with IATA Compliant packaging (cases ≤32 kg each)

Packaging options available in as few as 2 cases.

Accessories Options

2 kVa Generator

Ruggedized Laptop Controller with Integrated Linkcontrol Software

30 meter IFL cable

Fibre optics package

Lightning protection kit

De-icing kit

Vehicle power kit (MIL-STD 1275B)

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