



LEARN MORE



VTOL



UAV



HELICOPTER



AIRPLANE



# RANGER-U240

The **RANGER-U240** is a lightweight airborne laser scanner, especially designed for use on UAS and small manned airplanes or helicopters. Featuring the RIEGL VUX-240<sup>24</sup>, the **RANGER-U240** has a wide field of view of 75 degrees and an extremely fast data acquisition rate of up to 2400 kHz. The **RANGER-U240** is perfectly suited for high point density corridor mapping applications such as power line, railway track and pipeline inspection.

## FEATURES

- Easily mountable to unmanned platforms (UAVs) and to helicopters, gyrocopters, and other small manned aircrafts.
- Operating flight altitude up to 1,430 m / 4,700 ft
- Scan speed up to 600 lines/second

## PLATFORM

\* Without Accessories

OVERALL DIMENSIONS (with AIR NavBox)*	34.9 x 16.4 x 18.5 cm
OPERATING VOLTAGE	20 - 28 V DC
POWER CONSUMPTION*	85 W typical
OPERATING TEMPERATURE	0° - 40° C / 32° - 104° F
WEIGHT (including Air NavBox)*	4.7 kg / 10.4 lbs

## LiDAR SENSOR

LASER PROPERTIES	1550 nm
RANGE MINIMUM	5 m
RANGE MAXIMUM	1200 m @ 20% reflectivity, 300 kHz
MAX EFFECTIVE MEASUREMENT RATE	up to 2,000,000 meas./sec
SCAN SPEED	40 - 600 lines/second
LASER BEAM DIVERGENCE	0.35 mrad
LASER BEAM FOOTPRINT (Gaussian beam definition)	35 mm @ 100 m, 175 mm @ 500 m, 350 mm @ 1000 m
MAX MEASURING RANGE @ 20% (p 60%)	1200 m (1900 m)
HORIZONTAL FIELD OF VIEW	75°
LASER ACCURACY	0.01 m (1σ @ 150 m)
LASER PRECISION	15 mm
LASER SAFETY	CLASS 3R ENOHD 3.5 m

## NAVIGATION SYSTEM

CONSTELLATION SUPPORT	GPS + GLONASS + BEIDOU + GALILEO
SUPPORTED ALIGNMENT	Kinematic, Dual-Antenna
OPERATION MODES	Real-time, Post-Processed
ACCURACY POSITION	1 cm + 1 ppm GNSS baseline RMS Horizontal

## ACCURACY ATTITUDE<sup>(5)</sup>

ROLL, PITCH	0.002° RMS
HEADING	0.007° RMS

## QUICK SPECS

### ABSOLUTE ACCURACY <sup>(1)(2)(3)</sup>

2-4 cm RMSEz @ 200 m

### INTRASWATH PRECISION <sup>(1)(2)(4)</sup>

2 cm RMSDz @ 200 m

### EXAMPLE ACQUISITIONS:

#### HELICOPTER

- » 340 m AGL, 60 knots, 75° FOV, 2400 kHz
- » Swath Width = 520 m
- » Avg. Density = 124 points/m<sup>2</sup>

#### FIXED WING

- » 460 m AGL, 120 knots, 75° FOV, 1200 kHz
- » Swath Width = 705 m
- » Avg. Density = 23 points/m<sup>2</sup>

## APPLICATIONS



UTILITIES MAPPING



RAILWAY TRACK MAPPING



CONSTRUCTION SURVEYING



AGRICULTURE & FORESTRY MONITORING



OPEN PIT MINING OPERATIONS



OIL & GAS SURVEYING



GENERAL MAPPING

(1) Approximate values based on PLS test methods described at <https://docs.phoenixlidar.com/accuracy-standards-and-quantification>.

(2) Using a 90° downward field of view.

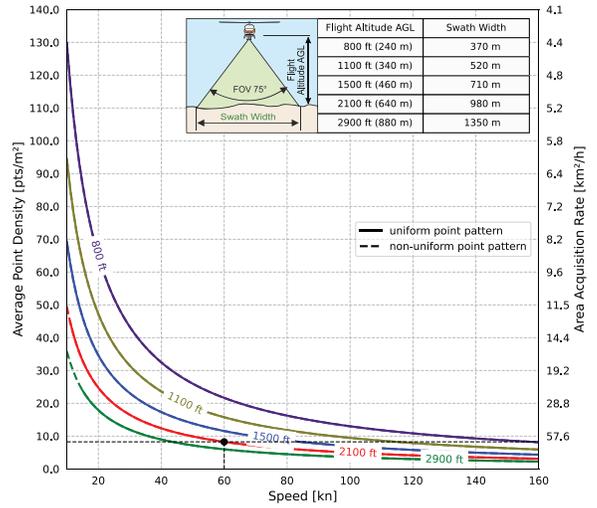
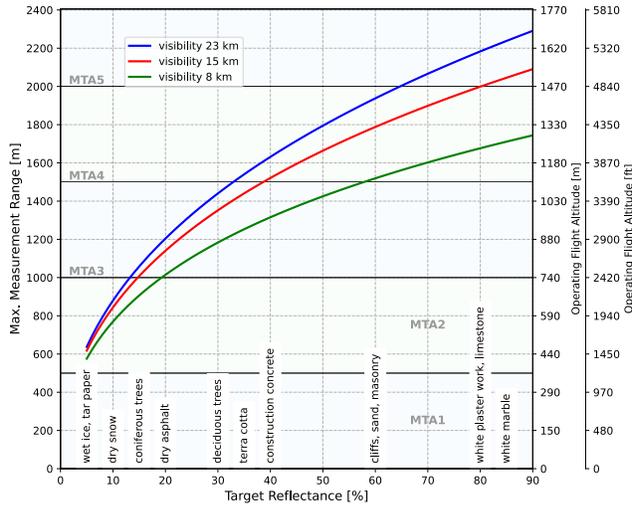
(3) Expected RMSEz when following the PLS recommended acquisition & processing workflow and ASPRS check point guidelines.

(4) Flat surfaces with >20% reflectivity at the laser's wavelength.

(5) Estimated post processed accuracy with IMU-30.

# MAX MEASUREMENT RANGE & POINT DENSITY RANGER-U240

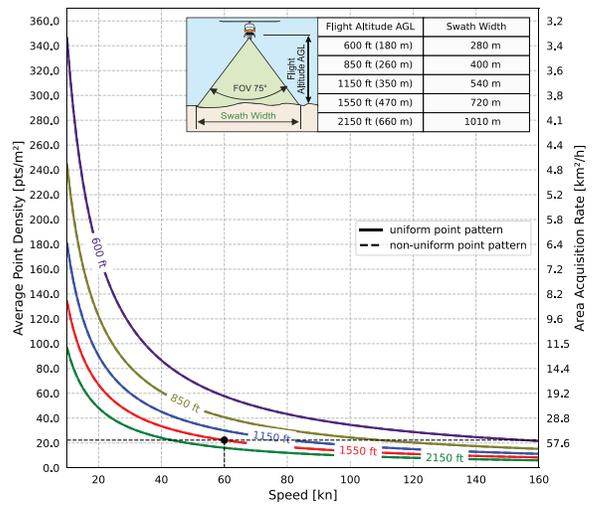
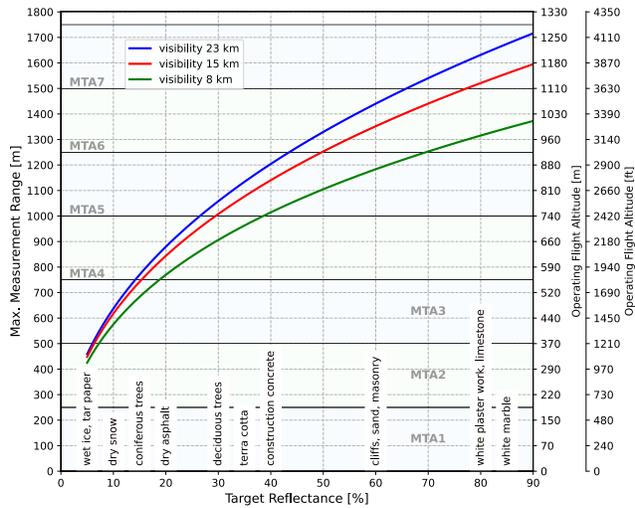
**LASER PULSE REPETITION RATE = 300 KHZ  
LASER POWER LEVEL = 100%**



**Example:** RANGER-U240 at 300,000 pulses/sec, laser power level 100%  
altitude 2,100 ft AGL, speed 60 kn

**Results:** point density - 8.3 pts/m<sup>2</sup>

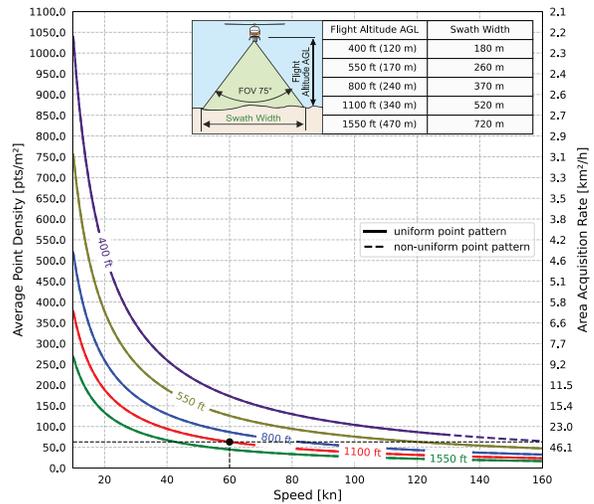
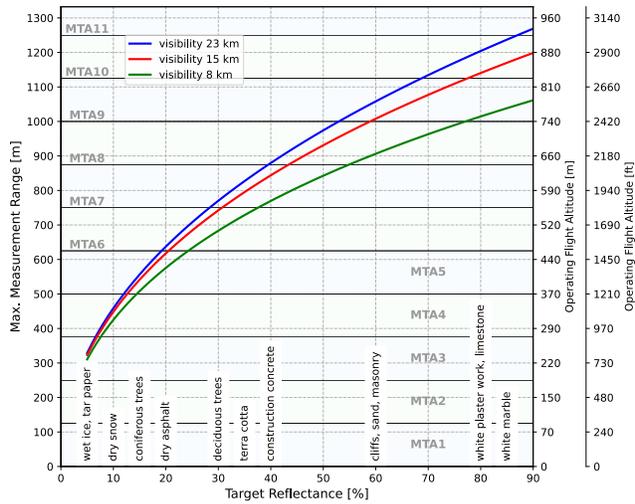
**LASER PULSE REPETITION RATE = 600 KHZ  
LASER POWER LEVEL = 100%**



**Example:** RANGER-U240 at 600,000 pulses/sec, laser power level 100%  
altitude 1,550 ft AGL, speed 60 kn

**Results:** point density - 22.3 pts/m<sup>2</sup>

**LASER PULSE REPETITION RATE = 1200 KHZ  
LASER POWER LEVEL = 100%**



**Example:** RANGER-U240 at 1,200,000 pulses/sec, laser power level 100%  
altitude 1,100 ft AGL, speed 60 kn

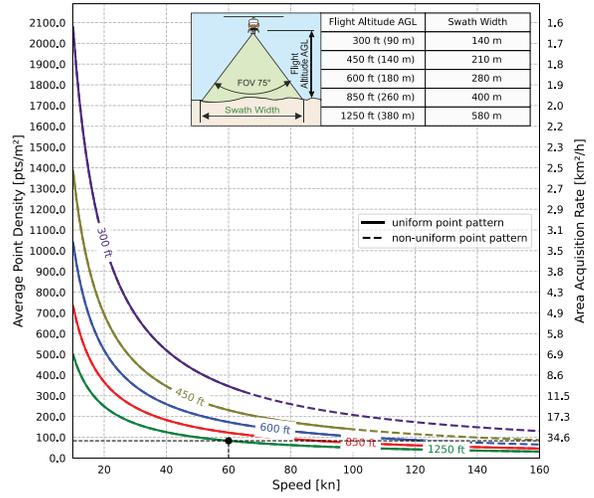
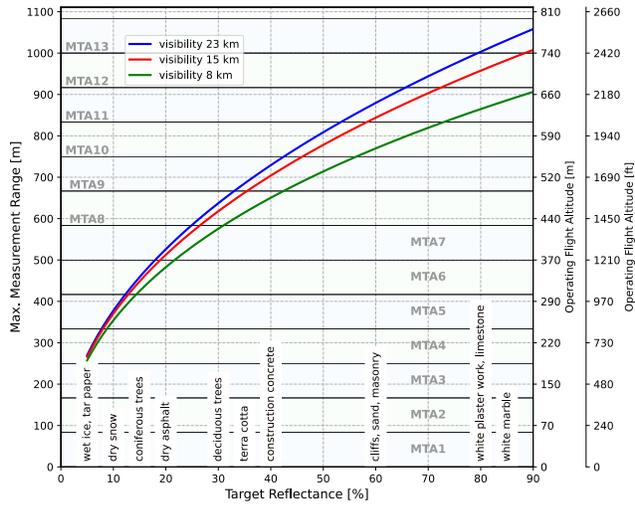
**Results:** point density - 63 pts/m<sup>2</sup>

**Operating Flight Altitude AGL given for the following conditions:**

- Ambiguity resolved by multiple-time-around (MTA) processing
- FOV 75°
- Average ambient brightness
- Target size ≥ laser footprint
- Roll angle up to ± 5°

# MAX MEASUREMENT RANGE & POINT DENSITY RANGER-U240

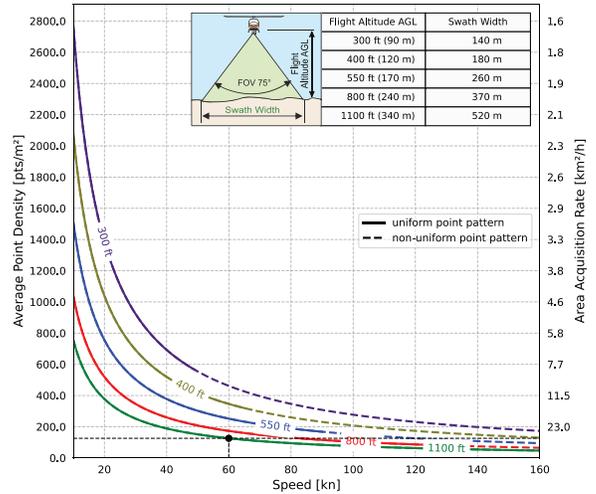
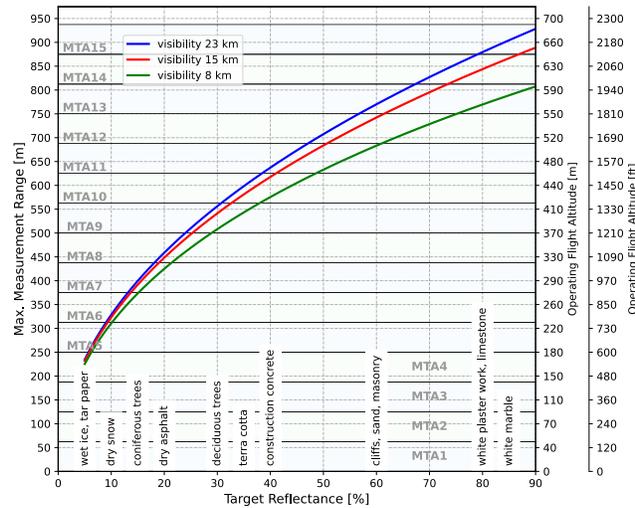
**LASER PULSE REPETITION RATE = 1800 KHZ  
LASER POWER LEVEL = 100%**



**Example:** RANGER-U240 at 1,800,000 pulses/sec, laser power level 100% altitude 1,250 ft AGL, speed 60 kn

**Results:** point density - 83.1 pts/m<sup>2</sup>

**LASER PULSE REPETITION RATE = 2400 KHZ  
LASER POWER LEVEL = 100%**



**Example:** RANGER-U240 at 2,400,000 pulses/sec, laser power level 100% altitude 1,100 ft AGL, speed 60 kn

**Results:** point density - 125.93 pts/m<sup>2</sup>

**Operating Flight Altitude AGL given for the following conditions:**

- Ambiguity resolved by multiple-time-around (MTA) processing
- FOV 75°
- Average ambient brightness
- Target size ≥ laser footprint
- Roll angle up to ±5°

## RANGER-U240 DIMENSIONS (mm)



## RANGE MEASUREMENT PERFORMANCE

Laser Pulse Repetition Rate PRR <sup>(1)</sup> Effective Measurement Rate (meas./sec)	300 kHz 250K	600 kHz 500K	1200 kHz 1000K	1800 kHz 1500K	2400 kHz 2000K
<b>Max. Measuring Range <sup>(2)(3)</sup></b> natural targets $\rho \geq 20\%$ natural targets $\rho \geq 60\%$	1200 m 1940 m	880 m 1440 m	640 m 1060 m	530 m 880 m	460 m 770 m
<b>Max. Operating Flight Altitude AGL <sup>2)(4)</sup></b> @ $\rho \geq 20\%$  @ $\rho \geq 60\%$	890 m (2900 ft)  1430 m (4700 ft)	650 m (2150 ft)  1060 m (3500 ft)	470 m (1550 ft)  780 m (2550 ft)	390 m (1250 ft)  650 m (2150 ft)	340 m (1100 ft)  570 m (1850 ft)
<b>Max. Number of Targets per Pulse <sup>(5)</sup></b>	<b>30</b>	<b>24</b>	<b>11</b>	<b>7</b>	<b>5</b>

1) Rounded average PRR.

2) Typical values for average conditions and average ambient brightness. In bright sunlight, the max. range is shorter than under an overcast sky.

3) The maximum range is specified for flat targets with size in excess of the laser beam diameter, perpendicular angle of incidence, and for atmospheric visibility of 23 km. Range ambiguities have to be resolved by multiple-time-around processing.

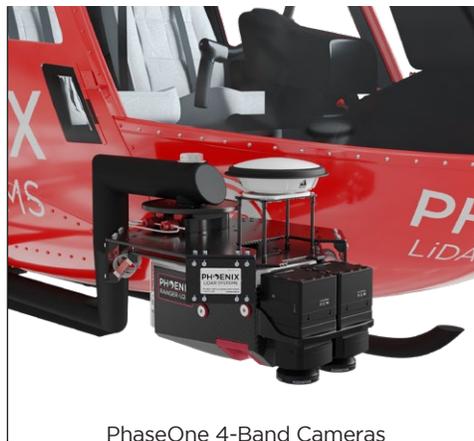
4) Effective FOV 75°, additional roll angle  $\pm 5^\circ$ .

5) If the laser beam hits, in part, more than one target, the laser's pulse power is split accordingly. Thus the achievable range is reduced.

## RANGER-U240 ACCESSORIES



Nadir PhaseOne iXM-GS120 (120 MP)



PhaseOne 4-Band Cameras



UltraPod UP1



**EXPLORE A PHOENIX LiDAR SYSTEM FOR YOUR TEAM, CONTACT US!**

PhoenixLiDAR.com • sales@phoenixlidar.com • USA +1.323.577.3366