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## RANGER-LR<sup>22</sup> LITE

The **RANGER-LR<sup>22</sup> LITE** is the new lighter long-range system configuration of our RANGER Series. Featuring the Riegl VUX-1LR<sup>22</sup> LiDAR, the **RANGER-LR<sup>22</sup> LITE** is designed for the most demanding mapping applications. With the ultimate combination of high density, long-range LiDAR with a powerful 1,550 nm laser and up to 15 returns that penetrate dense vegetation at high speeds and altitudes in large scan regions. This system is available in UAV, manned aircraft, mobile, VTOL, and backpack configurations.

### FEATURES

- High versatility payload designed with flexible mounting options
- Survey-grade (cm-level) accuracy with outstanding range capabilities for high altitude and high speed missions
- Imaging Upgrades: High-Res RGB, Thermal, Hyperspectral, and Panoramic cameras.



VTOL



UAV



VEHICLE



BACKPACK



HELICOPTER

### QUICK SPECS

#### ABSOLUTE ACCURACY

1.5 - 3.0 cm RMSEz @ 120 m Range <sup>(1)(2)(4)</sup>

#### INTRASWATH PRECISION <sup>(1)(2)(3)</sup>

2.0 cm RMSDz @ 120 m

#### EXAMPLE ACQUISITIONS:

##### UAV

- » 120 m AGL, 8 m/s, 90° FOV, 1500 kHz
- » Swath Width = 240 m
- » Avg. Density = 195 points/m<sup>2</sup>
- » Collection Rate = 6.9 km<sup>2</sup>/h

##### HELICOPTER

- » 200 m AGL, 60 knots, 90° FOV, 800 kHz
- » Swath Width = 400 m
- » Avg. Density = 16 points/m<sup>2</sup>
- » Collection Rate = 44 km<sup>2</sup>/h

### PLATFORM

\* Without Accessories

OVERALL DIMENSIONS\* 23.5 x 18.0 x 18.7 cm

OPERATING VOLTAGE 14 - 28 VDC

POWER CONSUMPTION\* 75 W typical

OPERATING TEMPERATURE 0° - 40° C / 32° - 104° F

WEIGHT\* 4.15 kg / 9.15 lbs

### LiDAR SENSOR

LASER PROPERTIES 1550 nm Class 1 (eye safe)

RANGE MIN 1.5 m at 1 MHz PRR

RANGE MAX 1,000 m at 20% reflectivity, 50 kHz PRR

MAX EFFECTIVE MEASUREMENT RATE 1,500 kHz

HORIZONTAL FIELD OF VIEW 360°

ACCURACY 15 mm one Sigma @ 150 m

SENSOR CLASSIFICATION IP64

WEIGHT 3.5 kg w/o fan

POWER CONSUMPTION 65 W typical

### NAVIGATION SYSTEM

CONSTELLATION SUPPORT GPS + GLONASS + BEIDOU + GALILEO

SUPPORT 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

### APPLICATIONS



OIL & GAS SURVEYING



UTILITIES MAPPING



RAILWAY TRACK MAPPING



AGRICULTURE AND FORESTRY MONITORING



CONSTRUCTION SITE SURVEYING



OPEN PIT MINING OPERATIONS



GENERAL MAPPING

(1) Approximate values based on PLS test condition.

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

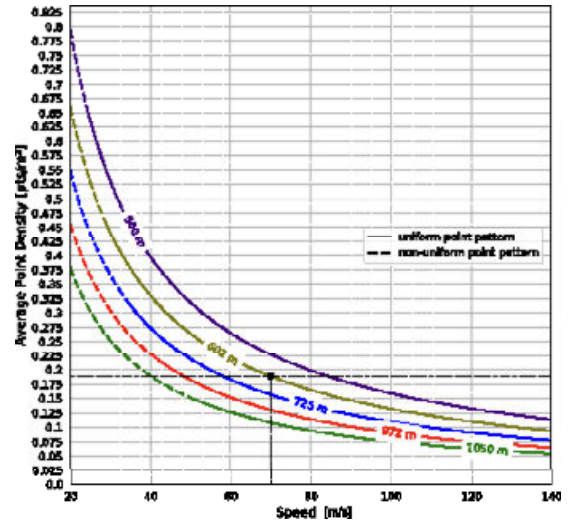
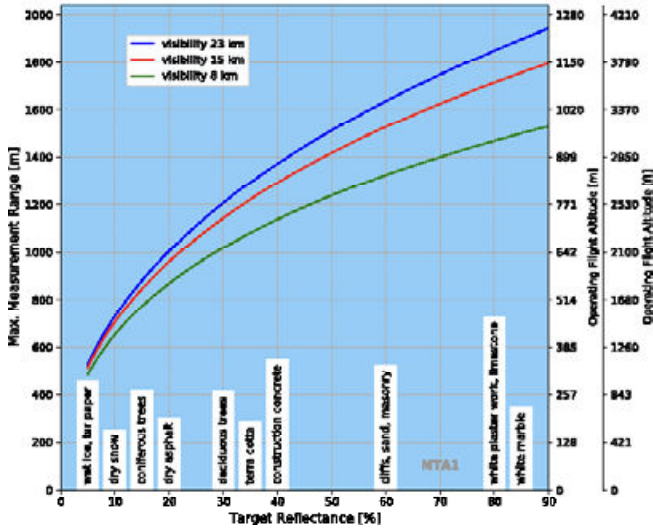
(3) Range of elevation values on flat surfaces with >20% reflectivity at the laser's wavelength.

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

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

# MAX MEASUREMENT RANGE & POINT DENSITY RANGER-LR<sup>22</sup> LITE

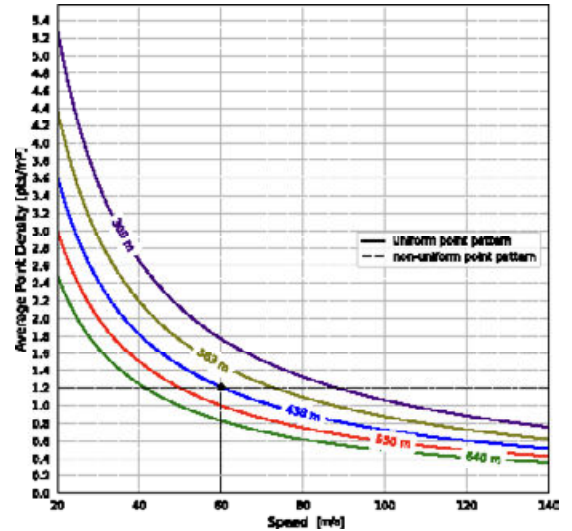
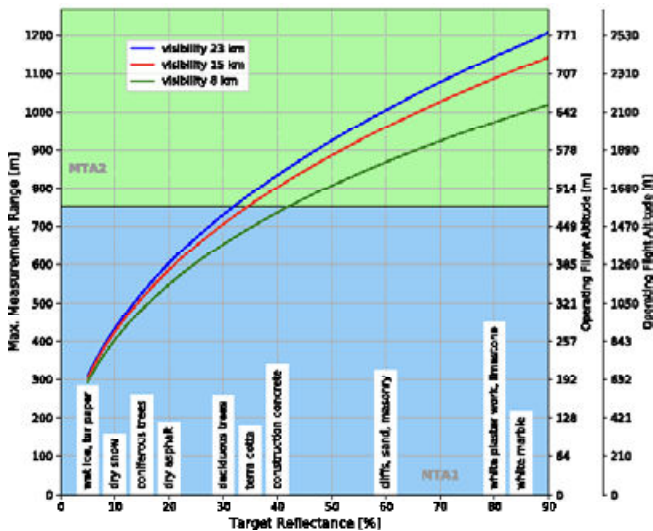
LASER PULSE REPETITION RATE = 50 KHZ  
LASER POWER LEVEL = 75%



Example: RANGER-LR<sup>22</sup> LITE at 50,000 pulses/second,  
speed = 70 m/s, range to target = 602 m

Results: point density - 0.19 pts/m<sup>2</sup>

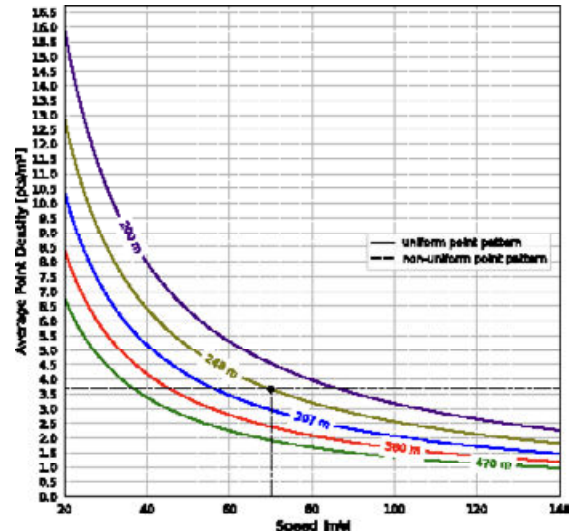
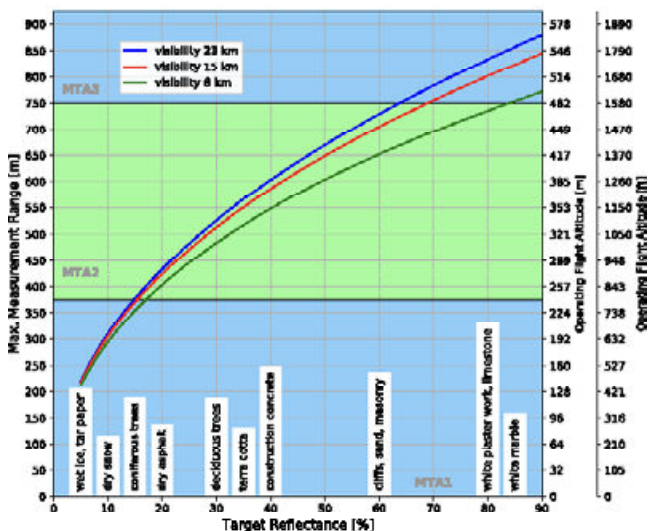
LASER PULSE REPETITION RATE = 200 KHZ  
LASER POWER LEVEL = 100%



Example: RANGER-LR<sup>22</sup> LITE at 200,000 pulses/second,  
speed = 60 m/s, range to target = 438 m

Results: point density - 1.2 pts/m<sup>2</sup>

LASER PULSE REPETITION RATE = 400 KHZ  
LASER POWER LEVEL = 100%



Example: RANGER-LR<sup>22</sup> LITE at 400,000 pulses/second,  
speed = 70 m/s, range to target = 248 m

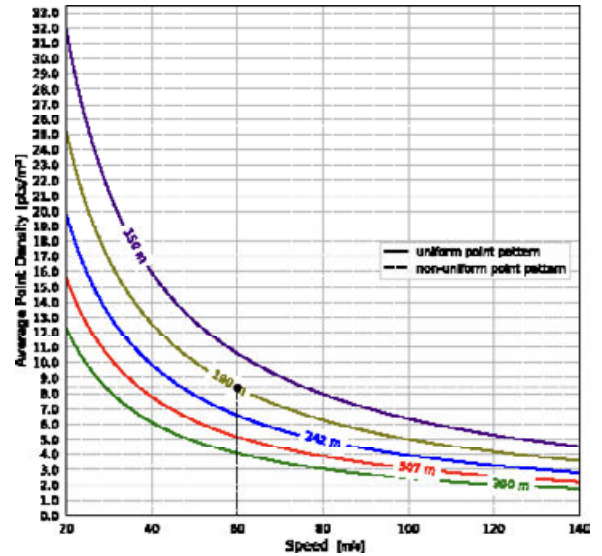
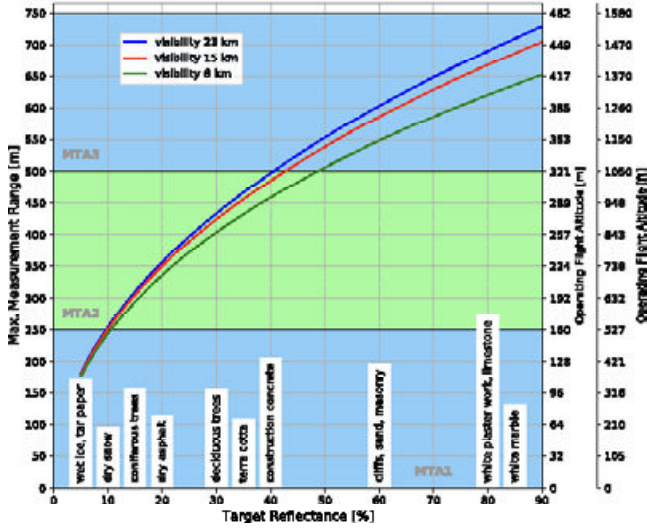
Results: point density - 3.6 pts/m<sup>2</sup>

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

- Ambiguity resolved by multiple-time-around (MTA) processing
- FOV +/- 45°
- Target size = laser footprint
- Average ambient brightness

# MAX MEASUREMENT RANGE & POINT DENSITY RANGER-LR<sup>22</sup> LITE

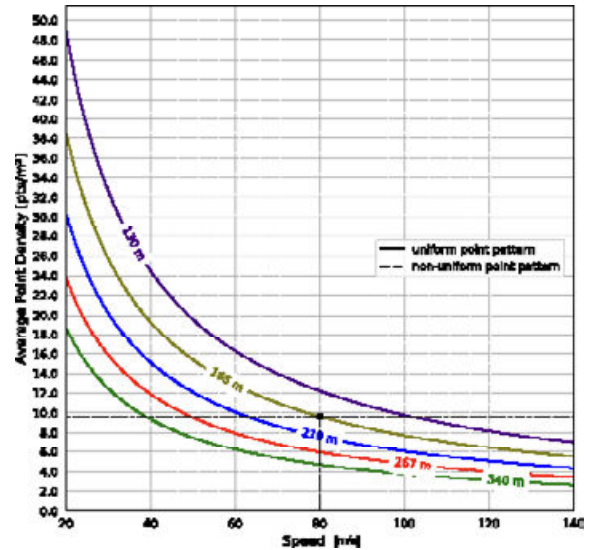
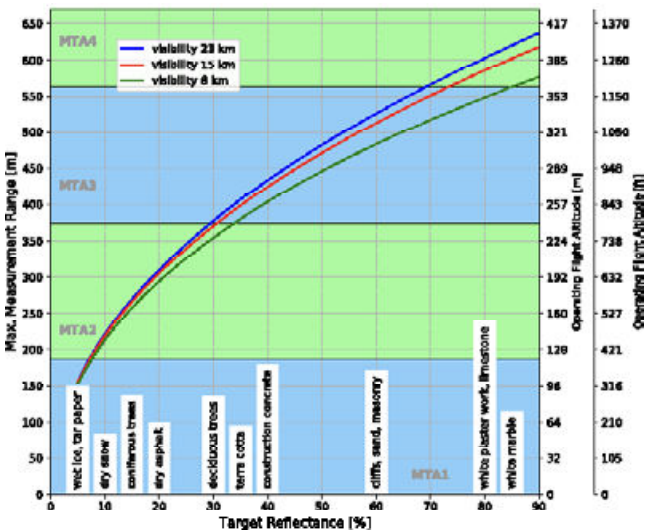
LASER PULSE REPETITION RATE = 600 KHZ  
LASER POWER LEVEL = 100%



Example: RANGER-LR<sup>22</sup> LITE at 600,000 pulses/second, speed = 60 m/s, range to target = 190 m

Results: point density - 8.4 pts/m<sup>2</sup>

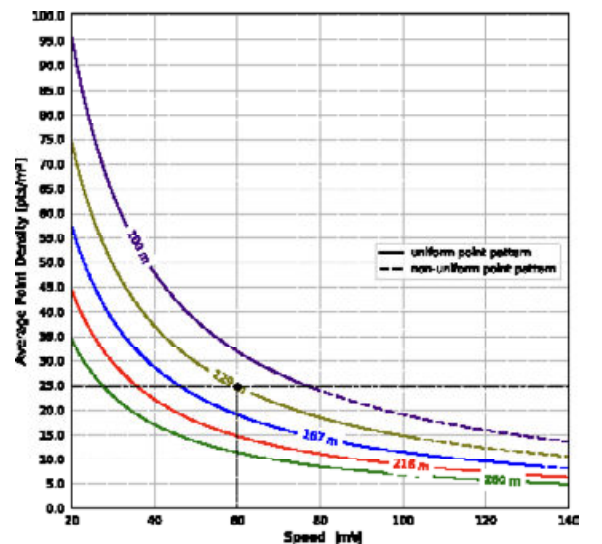
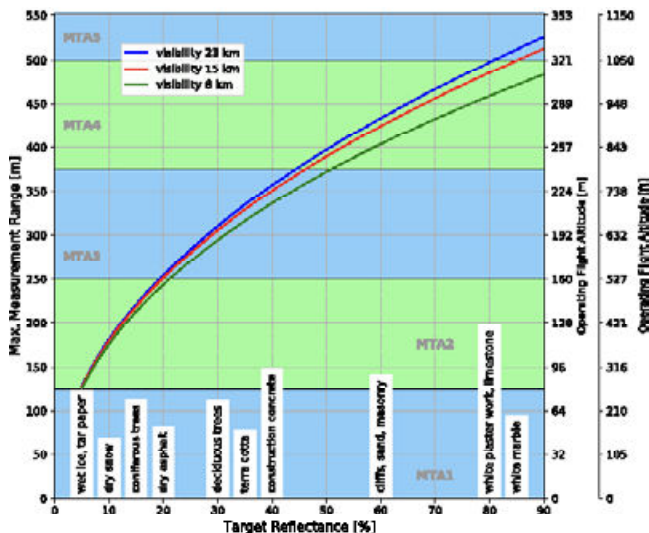
LASER PULSE REPETITION RATE = 800 KHZ  
LASER POWER LEVEL = 100%



Example: RANGER-LR<sup>22</sup> LITE at 800,000 pulses/second, speed = 80 m/s, range to target = 165 m

Results: point density - 9.7 pts/m<sup>2</sup>

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



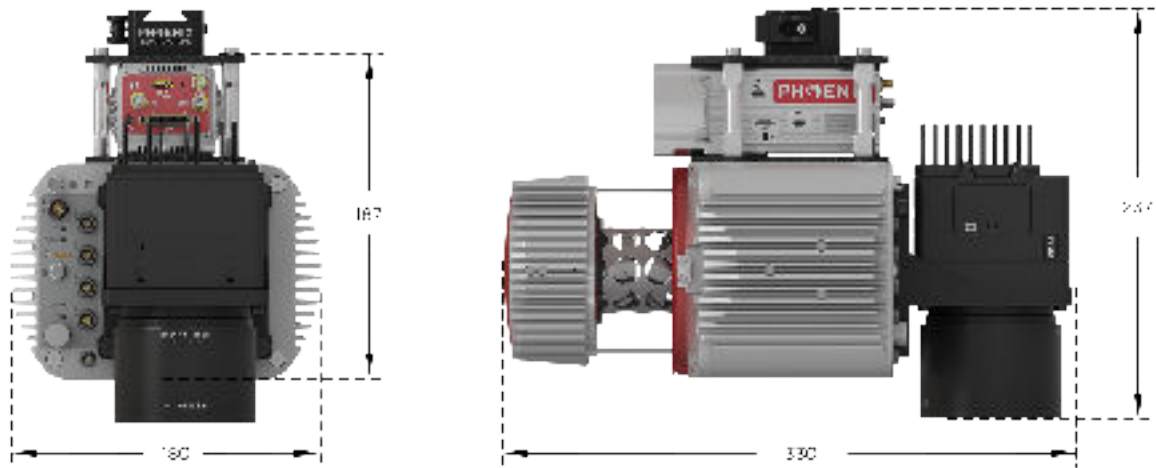
Example: RANGER-LR<sup>22</sup> LITE at 1200,000 pulses/second, speed = 60 m/s, range to target = 129 m

Results: point density - 25 pts/m<sup>2</sup>

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

- Ambiguity resolved by multiple-time-around (MTA) processing
- FOV +/- 45°
- Average ambient brightness
- Target size ≥ laser footprint

## RANGER-LR<sup>22</sup> LITE DIMENSIONS (mm)



## RANGER-LR<sup>22</sup> LITE MEASUREMENT PERFORMANCE

Laser Pulse Repetition Rate PRR <sup>1)5)</sup>	50 kHz	200 kHz	400 kHz	600 kHz	800 kHz	1200 kHz	1500 kHz
Max. Measuring Range <sup>3)4)</sup> natural targets $\rho \geq 20\%$ natural targets $\rho \geq 60\%$ natural targets $\rho \geq 80\%$	1000 m	600 m	435 m	355 m	310 m	255 m	230 m
	1630 m	1000 m	730 m	600 m	525 m	435m	390 m
	1845 m	1140 m	830 m	690 m	600 m	500 m	445 m
Max. Operating Flight Altitude AGL <sup>2)5)</sup> @ $\rho \geq 20\%$  @ $\rho \geq 60\%$	640 m (2110 ft)	390 m (1270 ft)	280 m (920 ft)	230 m (750 ft)	200 m (650 ft)	160 m (540 ft)	150 m (490 ft)
	1050 m (3440 ft)	640 m (2110 ft)	470 m (1540 ft)	390 m (1270 ft)	340 m (1100 ft)	280 m (920 ft)	250 m (820 ft)
Max. Number of Targets per Pulse <sup>6)</sup>	15	15	15	15	11	7	5

1) Rounded values.

2) Setting of intermediate PRR values possible.

3) Typical values for average conditions. 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. In bright sunlight, the max range is shorter than under overcast sky.

4) Ambiguity to be resolved by post-processing.

5) Flat terrain assumed, scan angle  $\pm 45^\circ$  FOV.

6) If more than one target is hit, the total laser transmitter power is split and, accordingly, the achievable range is reduced.

## RANGER-LR<sup>22</sup> LITE INTEGRATION OPTIONS



Sony ILX-LR1 (61 MP)



PhaseOne iXM-GS120 (120 MP)



360° Mobile Camera



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