

# RIEGL VQ<sup>®</sup>-580

- *especially designed to measure on snow & ice*
- *high-accuracy ranging based on echo digitization and online waveform processing*
- *high laser repetition rate - fast data acquisition*
- *multiple target capability - unlimited number of targets*
- *perfectly linear scan lines*
- *compact, rugged and lightweight design*
- *electrical interfaces for GPS data string and Sync Pulse (1PPS)*
- *mechanical interface for IMU mounting*
- *integrated LAN-TCP/IP interface*

The V-Line<sup>®</sup> Airborne Laser Scanner *RIEGL VQ-580* provides high speed, non-contact data acquisition using a narrow near-infrared laser beam and a fast line scanning mechanism. High-accuracy laser ranging is based on *RIEGL*'s unique echo digitization and online waveform processing, which allows achieving superior measurement results even under adverse atmospheric conditions, and the evaluation of multiple target echoes.

The scanning mechanism is based on a fast rotating multi-facet polygonal mirror, which provides fully linear, unidirectional and parallel scan lines.

The *RIEGL VQ-580* is a very compact and lightweight scanner, mountable in any orientation and even under limited space conditions on helicopters or UAVs. The instrument needs only one power supply and provides line scan data via the integrated LAN-TCP/IP interface. The binary data stream can easily be decoded by user-designed software making use of the available software library RIVLib.

#### Typical applications include

- *Glacier Mapping*
- *Snowfield Mapping*
- *Moist Grassland Mapping*
- *Corridor Mapping*



visit our website  
[www.riegl.com](http://www.riegl.com)

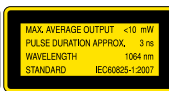


**RIEGL<sup>®</sup>**  
LASER MEASUREMENT SYSTEMS

## Laser Product Classification

## Class 3B Laser Product according to IEC60825-1:2007

The following clause applies for instruments delivered into the United States: Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.



## Range Measurement Performance

### Measuring Principle

time of flight measurement, echo signal digitization, online waveform processing

Laser Pulse Repetition Rate PRR <sup>1)</sup>	50 kHz	100 kHz	150 kHz	200 kHz	300 kHz
Effective Measurement Rate (meas./sec.) <sup>1) 2)</sup>	25 000	50 000	75 000	100 000	150 000
Max. Unambiguous Measuring Range <sup>3)</sup>					
natural targets $\rho \geq 20\%$	950 m	750 m	650 m	550 m	450 m
natural targets $\rho \geq 60\%$	1500 m	1200 m	900 m <sup>4)</sup>	700 m <sup>4)</sup>	450 m <sup>4)</sup>
Max. Operating Flight Altitude AGL <sup>2)</sup>	750 m 2450 ft	600 m 2000 ft	550 m 1800 ft	450 m 1500 ft	350 m 1150 ft
Max. Number of Targets per Pulse	practically unlimited (details on request)				

1) Rounded values.  
 2) Reflectivity  $\rho \geq 20\%$ ,  $\pm 30^\circ$  FOV, additional roll angle  $\pm 5^\circ$ .  
 3) The following conditions are assumed: target larger than the footprint of the laser beam, perpendicular angle of incidence, visibility 23 km, average ambient brightness.  
 4) Limited by maximum unambiguous range.

### Minimum Range

10 m

### Accuracy <sup>5) 7)</sup>

25 mm

### Precision <sup>6) 7)</sup>

25 mm

### Laser Pulse Repetition Rate <sup>1) 8)</sup>

up to 300 kHz

### Max. Effective Measurement Rate <sup>1)</sup>

up to 150 000 meas./sec. (@ 300 kHz PRR &  $60^\circ$  FOV)

### Echo Signal Intensity

for each echo signal, high-resolution 16 bit intensity information is provided

### Laser Wavelength

near infrared

### Laser Beam Divergence

0.2 mrad

### Laser Beam Footprint (Gaussian Beam Definition)

22 mm @ 100 m, 52 mm @ 250 m, 102 mm @ 500 m

5) Accuracy is the degree of conformity of a measured quantity to its actual (true) value.

6) Precision, also called reproducibility or repeatability, is the degree to which further measurements show the same result.

7) One sigma @ 150 m range under RIEGL test conditions.

8) User selectable.

## Scanner Performance

### Scanning Mechanism

rotating polygon mirror

### Field of View (selectable)

$60^\circ (+30^\circ / -30^\circ)$

### Scan Speed (selectable)

10 - 100 scans/sec

### Angular Step Width $\Delta \vartheta$ (selectable)

$0.006^\circ \leq \Delta \vartheta \leq 0.24^\circ$

between consecutive laser shots

### Angle Measurement Resolution

0.001°

### Internal Sync Timer

for real-time synchronized time stamping of scan data

### Scan Sync (optional)

scanner rotation synchronization

## Data Interfaces

### Configuration

LAN 10/100/1000 Mbit/sec

### Scan Data Output

LAN 10/100/1000 Mbit/sec

### GPS-System

Serial RS232 interface for data string with GPS-time information, TTL input for 1PPS synchronization pulse

## Mechanical Interfaces

### Mounting of the Laser Scanner

mounting plate (with 8 x M8 thread inserts and 6x mounting slots)

### Mounting of IMU sensor

3 x M6 thread inserts in the bottom and the top plate (rigidly coupled with the internal mechanical structure)

## General Technical Data

### Power Supply Input Voltage

18 - 32 V DC

### Current Consumption

typ. 65 W

### Main Dimensions / Weight

222 x 360.5 mm (diameter x length), approx. 12 kg

### Humidity

max. 80 % non condensing @  $+31^\circ\text{C}$

### Protection Class

IP64, dust and splash-proof

### Max. Flight Altitude (operating)

16 500 ft (5 000 m) above MSL

### Max. Flight Altitude (not operating)

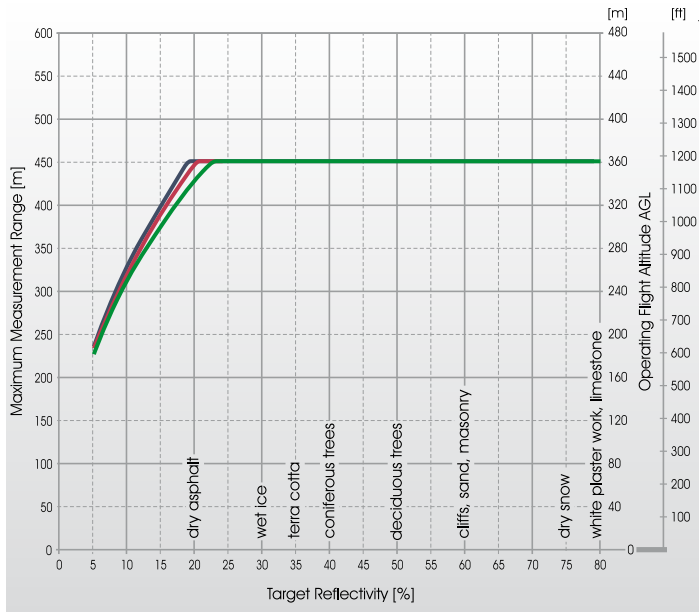
18 000 ft (5 500 m) above MSL

### Temperature Range

$-10^\circ\text{C}$  up to  $+40^\circ\text{C}$  (operation) /  $-20^\circ\text{C}$  up to  $+50^\circ\text{C}$  (storage)

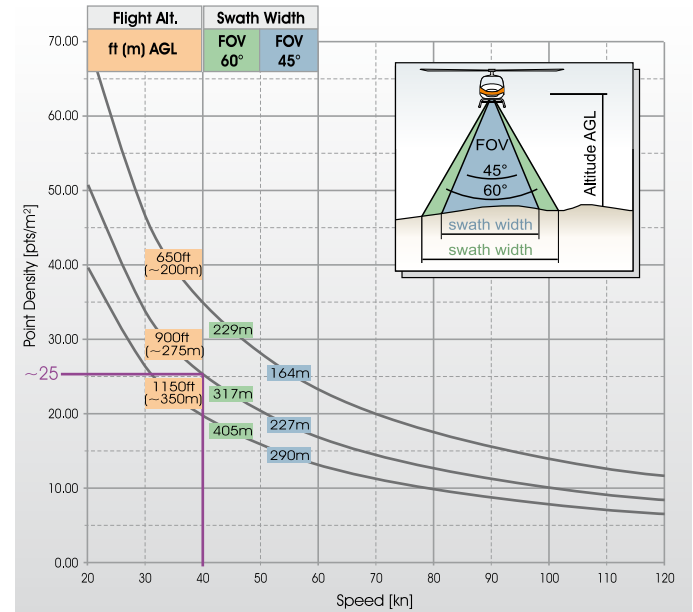
# Maximum Measurement Range & Point Density for RIEGL VQ<sup>®</sup>-580

PRR = 300 kHz



- @ visibility 23 km
- @ visibility 15 km
- @ visibility 8 km

PRR = 300 kHz

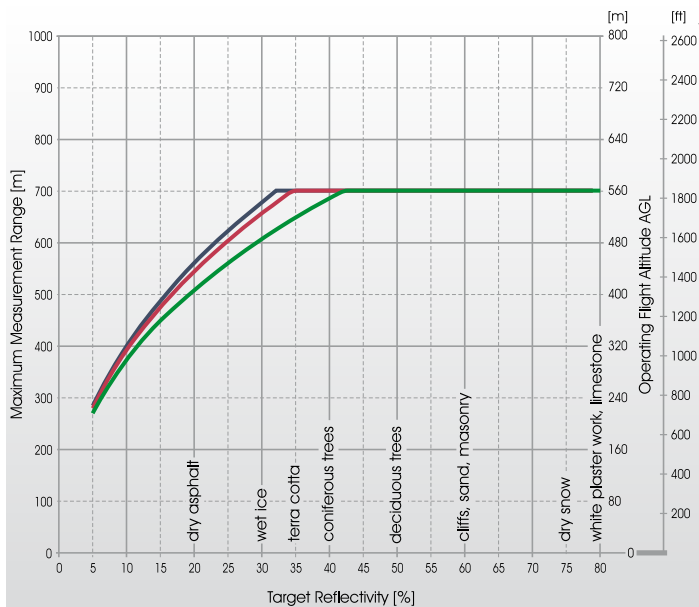


Example: VQ-580 at 300,000 pulses/second  
Altitude = 900ft AGL, Speed = 40 kn  
Resulting Point Density ~ 25 pts/m<sup>2</sup>

**For the Operating Flight Altitude AGL, the following conditions are assumed:**

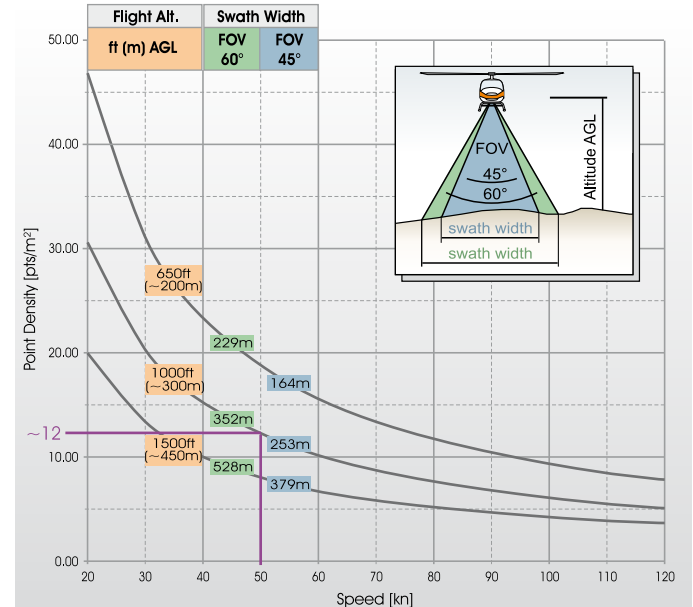
- target size ≥ laser footprint
- average ambient brightness
- scan angle 60°
- roll angle ±6°

PRR = 200 kHz



- @ visibility 23 km
- @ visibility 15 km
- @ visibility 8 km

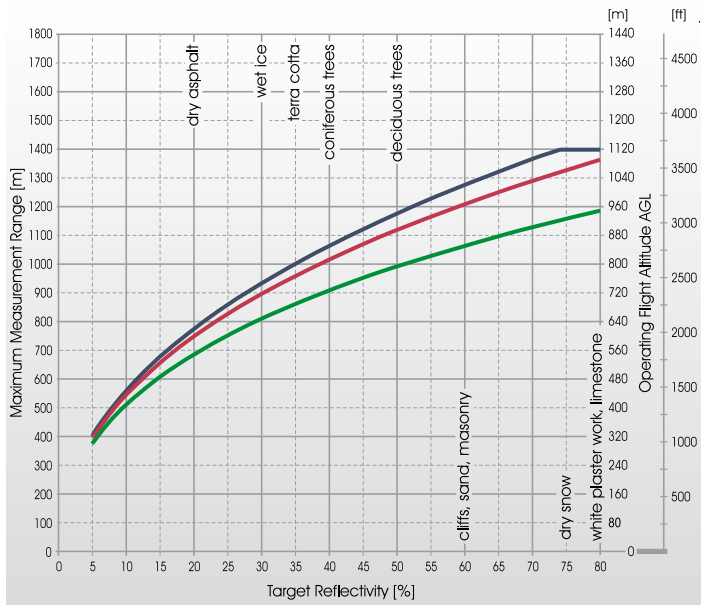
PRR = 200 kHz



Example: VQ-580 at 200,000 pulses/second  
Altitude = 1000ft AGL, Speed = 50 kn  
Resulting Point Density ~ 12 pts/m<sup>2</sup>

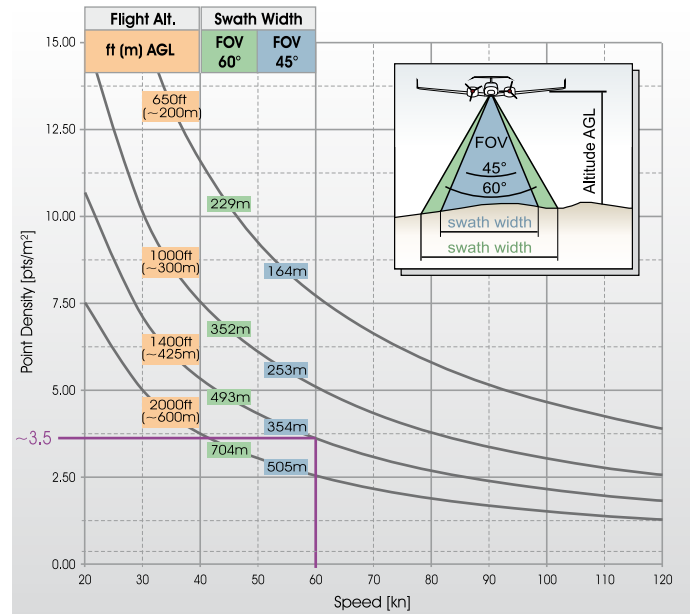
# Maximum Measurement Range & Point Density for RIEGL VQ<sup>®</sup>-580

PRR = 100 kHz



— @ visibility 23 km  
 — @ visibility 15 km  
 — @ visibility 8 km

PRR = 100 kHz

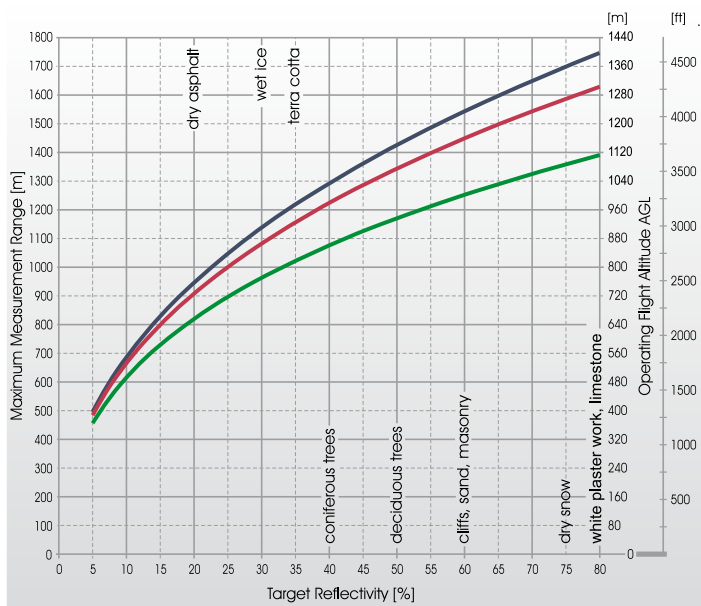


Example: VQ-580 at 100,000 pulses/second  
 Altitude = 1400ft AGL, Speed = 60 kn  
 Resulting Point Density ~ 3.5 pts/m<sup>2</sup>

**For the Operating Flight Altitude AGL, the following conditions are assumed:**

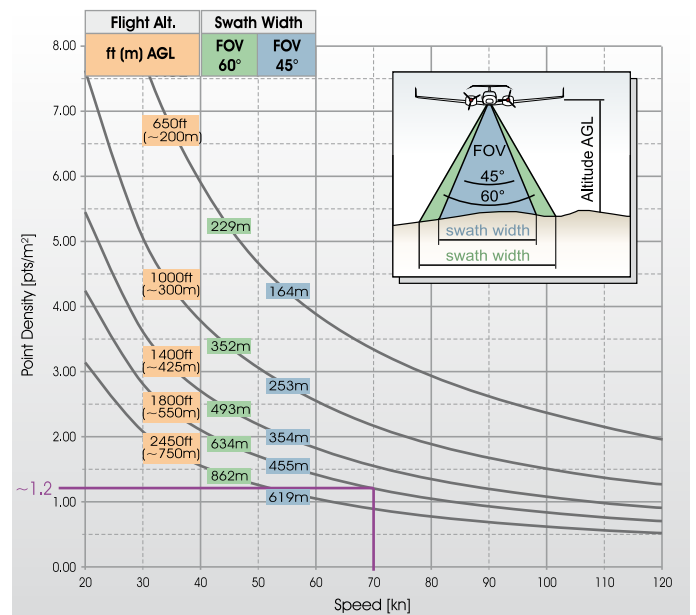
- target size ≥ laser footprint
- average ambient brightness
- scan angle 60°
- roll angle ±6°

PRR = 50 kHz



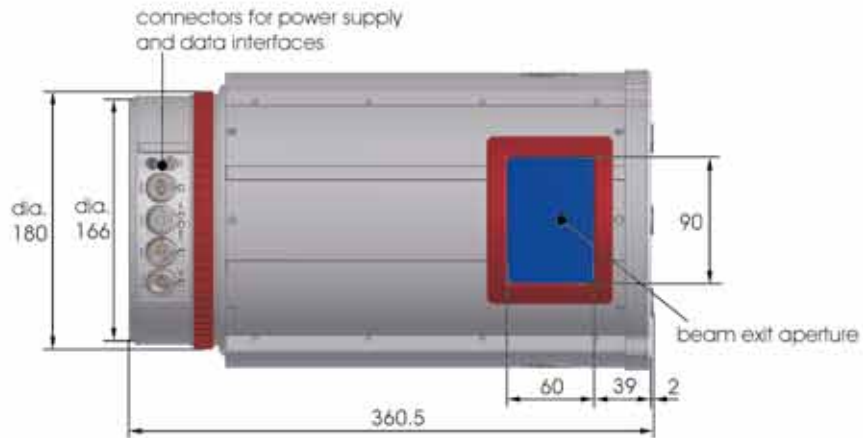
— @ visibility 23 km  
 — @ visibility 15 km  
 — @ visibility 8 km

PRR = 50 kHz

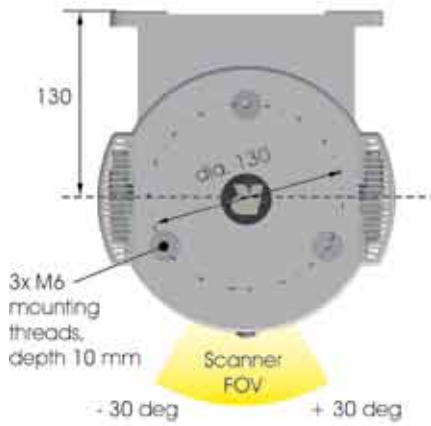


Example: VQ-580 at 50,000 pulses/second  
 Altitude = 1800ft AGL, Speed = 70 kn  
 Resulting Point Density ~ 1.2 pts/m<sup>2</sup>

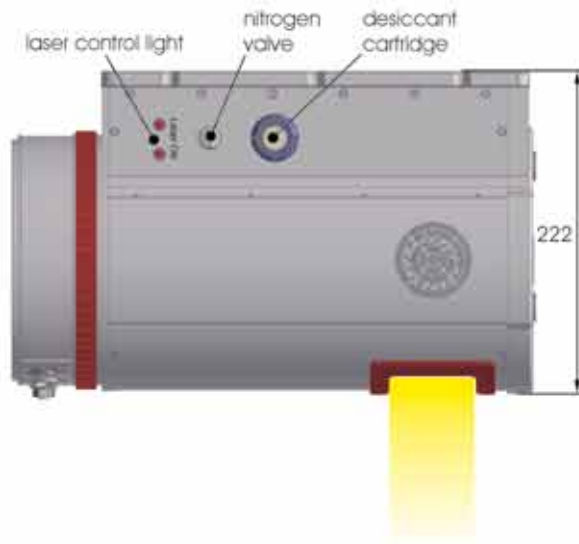
front view



top view



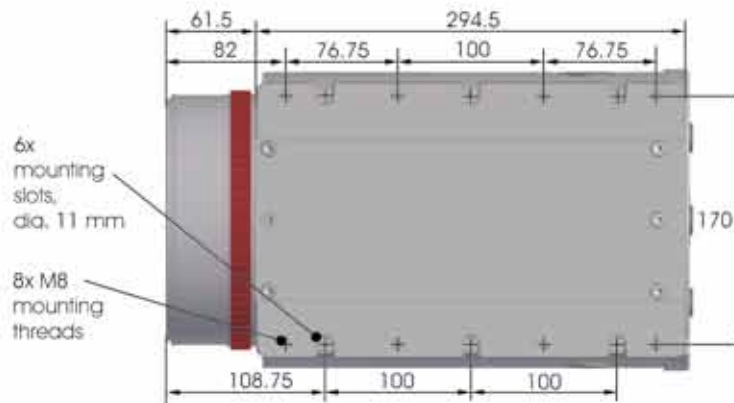
side view



bottom view



rear view



all dimensions in mm



**RIEGL**®  
LASER MEASUREMENT SYSTEMS

**RIEGL Laser Measurement Systems GmbH, 3580 Horn, Austria**  
Tel.: +43-2982-4211, Fax: +43-2982-4210, E-mail: office@riegl.co.at

**RIEGL USA Inc., Orlando, Florida 32819, USA**  
Tel.: +1-407-248-9927, Fax: +1-407-248-2636, E-mail: info@rieglusa.com

**RIEGL Japan Ltd., Tokyo 1640013, Japan**  
Tel.: +81-3-3382-7340, Fax: +81-3-3382-5843, E-mail: info@riegl-japan.co.jp

[www.riegl.com](http://www.riegl.com)