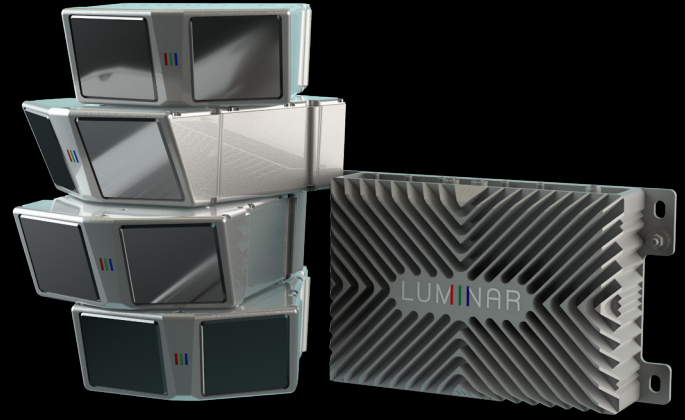


# LUMINAR

## HYDRA

Hydra is a high-performance lidar and perception engine for testing and development programs. This enables programs to accelerate test and development fleets towards series-production applications.

For consumer safety and convenience features as well as autonomous services, Hydra delivers a perception system for forward-looking highway, 360° urban, and broad off-road applications thanks to a scalable architecture suitable for one or multiple lidar sensors.



Hydra lidar sensors

Hydra reference ECU

With camera-like resolution up to 200 points per square degree and high data fidelity, Hydra reliably sees where objects are and understands what they are—even small or dark objects at long distances.

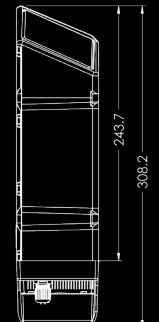
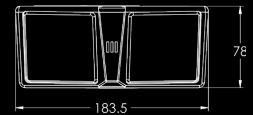
Combined with ongoing software updates, Hydra becomes more capable throughout the testing and development process.



### SENSOR SPECIFICATIONS

<b>250m</b> <10% Reflectivity	<b>500m</b> Max Range	<b>0.07°</b> Min. Horizontal Resolution	<b>0.03°</b> Min. Vertical Resolution
<b>120°</b> Horizontal FoV	<b>0-30°</b> Configurable Vertical FoV	<b>640 lines/sec</b> Software Configurable	<b>1 cm</b> Range Precision
<b>1-30</b> Frames per Second	<b>7 bits</b> Reflectance Resolution (resolvable)	<b>&lt; 2m</b> Min. Measurement Range	<b>3</b> Max Range Returns Per Point

### DIMENSIONS



### SENSOR ENVIRONMENTAL SPECIFICATIONS

Water & Dust Ingress	Vibration	Shock	Ambient Temp. Full Performance	Storage Temperature
IP67	SAE J1211	IEC 60068 -2-27 to 20g	-10° to 40° C†	-40° to 85° C

### CLASSIFICATIONS

Laser Safety	Export Control
Class 1	EAR99 (US DoC)

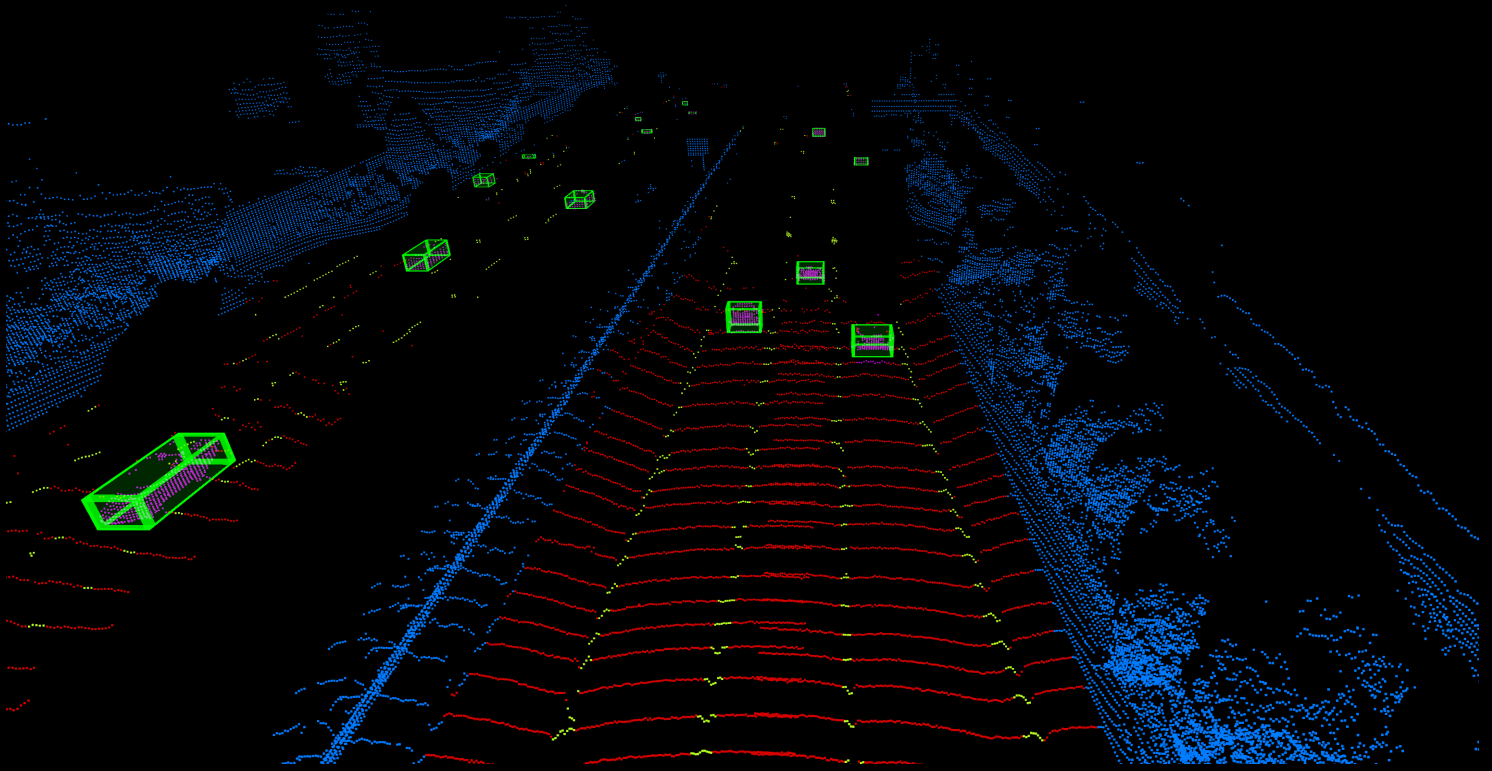
### ELECTRICAL

Operational	Power Consumption
9-32V Input Voltage	55 W

†Expanded Range enabled through vehicle integration

# ADVANCED DEVELOPMENT TOOLS & PERCEPTION

Hydra provides a full-stack or modular sensor and perception output and control components, enabling developers to focus on the full autonomy stack and expedite final system integration.



## Core Sensor Functionality

<b>Point Cloud Attributes</b>	3D Points ( $\theta, \phi, r$ ); reflectance (R); surface normal ( $n_x, n_y, n_z$ ); velocity ( $v_x, v_y$ )
<b>Software Configurable Field Coverage</b>	Real-time horizon detection Adaptive scan patterns Extrinsic sensor calibration
<b>State Estimation</b>	Lidar odometry with IMU and GPS
<b>Software Tools</b>	EnVision - visualization and control

## Full-Stack Perception

<b>Semantic Segmentation Classes</b>	Drivable free-space 80m Lane markers 150m Object 250m
<b>Object Classes</b>	Vehicle, large vehicle, pedestrian
<b>Lane Marking Classes</b>	Solid, dashed and dotted
<b>Velocity</b>	Instant velocity detection at point and object levels, both lateral and longitudinal
<b>Software Tools</b>	Synthetic Sensor Suite - lidar simulation

## HYDRA REFERENCE ECU SPECIFICATIONS

Power Consumption	GPU	CPU	I/O	Wireless
30 - 40 W sensor count dependent	512-core NVIDIA Volta™	8-Core ARM v8.2 64-bit NVIDIA Carmel™	2x CAN, 2xLAN, 2x USB 3.1 4x Hydra lidar sensors	LTE, GPS, Wi-Fi

# LUMINAR

<http://luminartech.com>  
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