

## Compact 360° 3D Camera

PAL Mini is an ultra-compact, single sensor omnidirectional 3D vision system providing 360° stereoscopic sensing with depth information. PAL Mini enables visual intelligence with an unparalleled field of view that eliminates blind spots and combines full color video with depth information in a single video stream. The easy-to-use system has no moving parts, making it ideal for manufacturers and operators in robotics, factory, and warehouse automation where efficiency and reliability are critical.

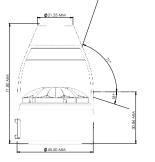
DreamVu

Key Features	360° Horizontal and 89° Vertical Field-of-View RGB and depth provided Single CMOS sensor with no moving parts USB interface – power and data
Use Cases	Obstacle detection in autonomous robots Floor and cliff detection in commercial cleaning robots Proximity sensor replacement Human presence detection with tracking
Availability	PAL Mini PAL Mini Starter Kit PAL Mini Obstacle Detection Starter Kit
Additional Documents	PAL Mini Starter Kit Guide

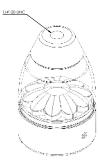
## **Camera Specifications**

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S	Stereo Image Output	3440 x 1019 @ 10 fps   2304 x 684 @ 20 fps		
		1720 x 512 @ 40 fps   860 x 256 @ 100 fps per image		
Stereo Image <sub>M</sub> Performance	1aximum Field of View	See Figure 1		
	1inimum Angular Resolution	0.11° (H) x 0.09° (V) / pixel		
S	Shutter Type	Rolling Shutter		
	Depth Map	3440 x 1019 @ 10 fps   2304 x 684 @ 20 fps		
		1720 x 512 @ 40 fps   860 x 256 @ 100 fps		
	Maximum Field of View	See Figure 1		
	Minimum Angular Resolution	0.11° (H) x 0.09° (V) / pixel		
Dopen	Minimum Range	0 cm		
Performance	Range Accuracy	See Range Performance Graph		
	Range Resolution	0.2 cm at 5 cm and 4.4 cm at 300 cm (at 45 cm mounting height)		
	Latency	See Performance Benchmarking Table		
	Timestamp Accuracy	5 ms		
Point Cloud	Number of Points	Up to 35M points/second		
Performance	Formats	2.5D, 3D		
	Operating System	Ubuntu 16.04, 18.04		
Software Compatibility	Available RAM	2 GB		
	Library Dependencies	OpenCV 3.4.4, ROS Melodic		
Interfaces	Communication Interface	USB 3.0 (Data & Power)		
Electrical data	Operating Voltage	5V ± 0.25V		
	Maximum Power Usage	2.54 W		

Mechanical Data	Weight	70 g		
	Dimensions (See Figure 1)	Bottom Diameter: 45.5 mm		
		Top Diameter: 21.35 mm		
		Height: 71.8 mm		
	Materials	ABS, PC, Aluminum & Glass		
	Housing Color	Matte Black (Top & Bottom)		
	Mounting (See Figures 2 and 3)	UNC 1/4"-20, Top & Bottom		
Environmental Conditions	Ambient Temperature	-30° to +55°C		
	Storage Temperature	-40° to +85°C		
	Ambient Lighting	5 Lux to 25,000 Lux		
	IP Rating	IP64		
	Humidity	RH-95% Non Condensing @ 55°C		
Resistance	Shock Resistance	Up to 25g in all directions		
	Vibration Resistance	5 Hz to 500 Hz: 2g, 10 sweep cycles $\pm$ X, Y, Z axes tested f 9 hours		
Accessories (included)	USB 3.0 Type C to Type A cable			
	Microfiber Cloth			
Important Notes	Fingerprints and other buildup on the transparent housing may degrade performance.			
	Routine cleaning is recommended			
	A clean dry microfiber cloth should be used for cleaning the polycarbonate dome. Only plain water is safe for dried on or stubborn dirt.			





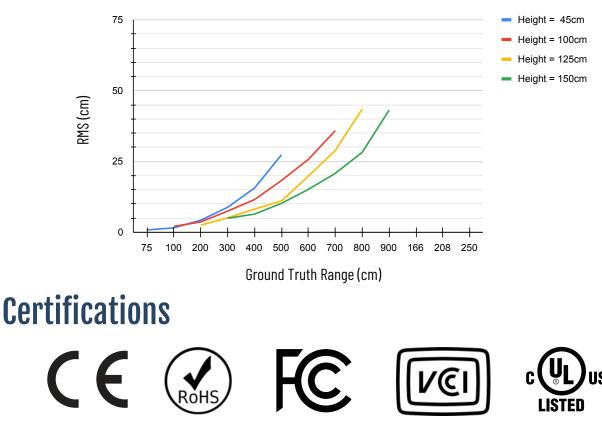


## **Performance Benchmarking**

	Jetson Nano	Jetson NX	Jetson AGX	Intel NUC11PAHI5
Refresh Rate	10 FPS	20 FPS	20 FPS	20 FPS
Latency	300 ms	200 ms	200 ms	200 ms
Available RAM Required	2GB	2.9GB	2.9GB	1.6GB
Compute Requirement	72% of 1.4Ghz, Quad-core ARM Cortex-A57 MPCore processor, 99%	67% of 1.4Ghz, 6-core NVIDIA Carmel ARM v8.2 64-bit CPU,79% GPU	44% of 1.1Ghz, 8- core ARM v8.2 64- bit CPU, 8MB L2 + 4MB L3, 59% GPU	70% of i5-1135G7 @ 2.40GHz x 8
Power Mode	MAXN	15W 6core	30W ALL	-

Performance on Reference Hardware with 1x PAL Mini at maximum of 360° Field of View. Higher performance is expected with the reduced Field of View.

## **Range Performance**



PAL Mini Range Accuracy vs Mounting Height (Inverted Orientation)