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CAPTURE
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Now capable of up to 11,000 profiles/sec

Zebra **AltiZ**

High-fidelity 3D profile sensors

Overview

High-fidelity 3D scanning

Zebra® AltiZ[1] is a series of high-fidelity 3D profile sensors. Each sensor features a dual-camera single-laser design that greatly lessens the scanning gaps often encountered at critical surface junctures because of optical occlusions. Unique algorithms running inside the sensor automatically generate various types of reliable 3D data—individual profiles, depth maps, or point clouds—obtained by smartly combining or selecting the pixel data from the two integrated image sensors, which is automatically sampled for a constant horizontal resolution.

Flexible operation and intuitive setup

The two cameras within a Zebra AltiZ can operate either synchronously or in alternation. The former provides maximum reproduction quality and robustness; the latter delivers a scanning rate twice that of the former while still providing some defense against occlusion. The scanning volume—affecting the scanning rate—is set in convenient real-world units. An internal object detection mechanism is available to automatically and optimally start and stop scanning to simplify operation by eliminating the need to supply an external trigger to inform of the presence of an object.

Standard interface, discrete I/Os, and power

The command and data interface of a Zebra AltiZ is done via a Gigabit Ethernet port with the GigE Vision communication protocol. The sensors' 24 V-compatible digital I/Os are present for connecting to an incremental encoder and synchronizing multiple 3D sensors, which is useful when there is need to scan different sides of an object or surfaces larger than can be covered by a single 3D sensor. Zebra AltiZ supports PoE for simpler cabling but also features an alternate 24 V power input.

Available as a separate accessory, the Zebra I/O Breakout Box simplifies the connection of a Zebra AltiZ by giving convenient access to the digital I/Os through terminal blocks. The I/O breakout box comes with push buttons and switches for testing connections; it can also power one Zebra AltiZ if PoE is unavailable, and be mounted on a standard DIN rail. This accessory is also included in the Zebra AltiZ starter kit, a bundle of all the accessories needed to get going quickly with the Zebra AltiZ.

Solid construction and varied mounting

Zebra AltiZ features a sturdy IP67-rated[2] aluminium housing with M12 connectors that make it perfectly suited for harsh industrial environments. Isolated discrete I/Os provide protection against improper electrical hookup. Back, side, and top attachment points accepting M4-threaded screws are available for fixing a Zebra AltiZ to gantries and robots. Through-hole guides are also included to enable higher-accuracy installation and the alignment of neighboring Zebra AltiZ units.

Zebra AltiZ at a glance

Leverage dual-camera single-laser design to deliver exceptionally high 3D reproduction fidelity

Scan scenes quickly with profiling rates of up to 11,000 per second

Gain from unique embedded algorithms to generate consistent profiles, depth maps, or point clouds

Benefit from truly standard GigE Vision® interface to work directly with Zebra Imaging and third-party vision software

Simplify cabling with Power-over-Ethernet (PoE) support

Deploy confidently in tough industrial settings thanks to a solid IP67-rated[2] aluminum housing and M12 connectors

Benefit from several fastening points to facilitate fixing one or more sensors to gantries and robots

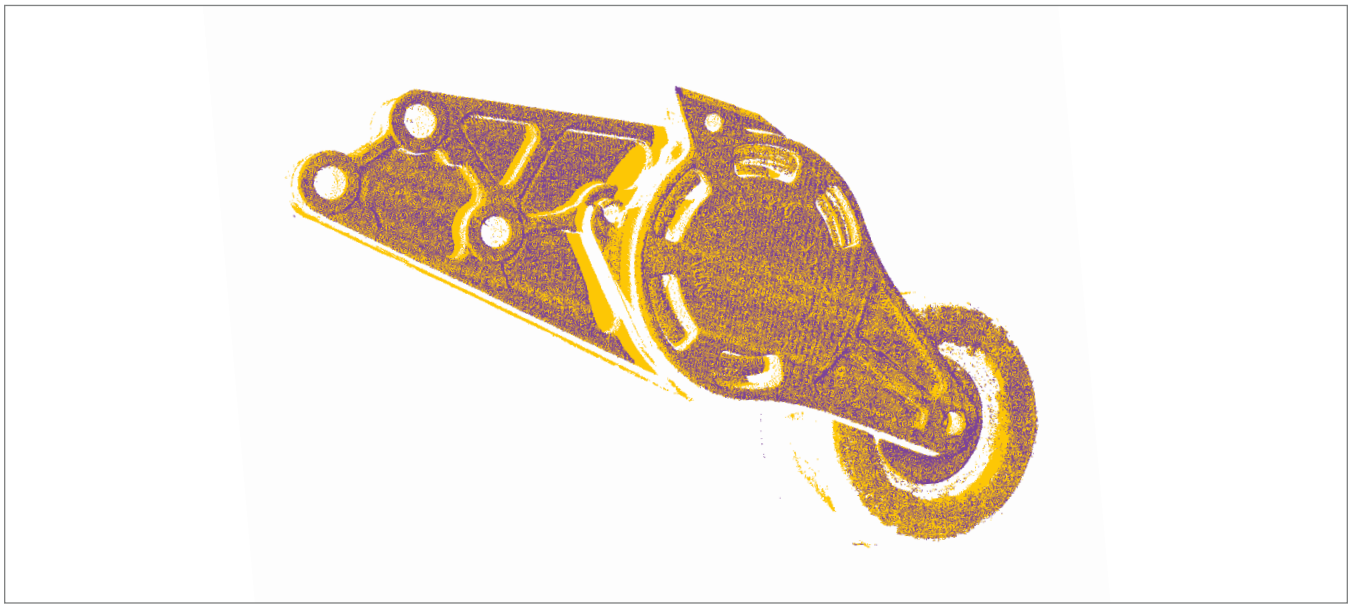
Streamline sensor setup and verification via the Aurora Capture Works utility for Windows® and Linux®

3D line profiling

3D line profiling is a long-standing and well-established technique for generating a three-dimensional representation of an object. It uses the principle of laser triangulation whereby an image sensor views a laser line that projects onto an object. The laser line bends to follow the contour of the object, which results in a profile; this profile is analyzed to compute the depth or height along the width of the laser line. Object length is determine by accumulating profiles at regular intervals by either moving the 3D device over the fixed object or the object below the fixed 3D device.

Overview (cont.)

Sample part scan



Merged point cloud showing the higher scanning fidelity obtained when using two cameras instead of just one. Zones in solid yellow are only visible when scanning with the two opposed cameras.

Software Environment

Field-proven application development software

Zebra AltiZ pairs well with Zebra Aurora Imaging Library,™ (formerly Matrox Imaging Library) a comprehensive software development kit (SDK) for Windows and Linux with a more than 25-year history of reliable performance. This toolkit features interactive software and programming functions for image capture, processing, analysis, display, and archiving. Refer to the Aurora Imaging Library datasheet for more information.

The 3D sensors also work with Zebra Aurora Design Assistant™ (formerly Matrox Design Assistant) a Windows-based integrated development environment (IDE) based on Aurora Imaging Library, where vision applications result from the construction of flowcharts and their human-machine interface (HMI) from the creation of web pages. Refer to the Aurora Design Assistant datasheet for more information.

Interactive profiler setup

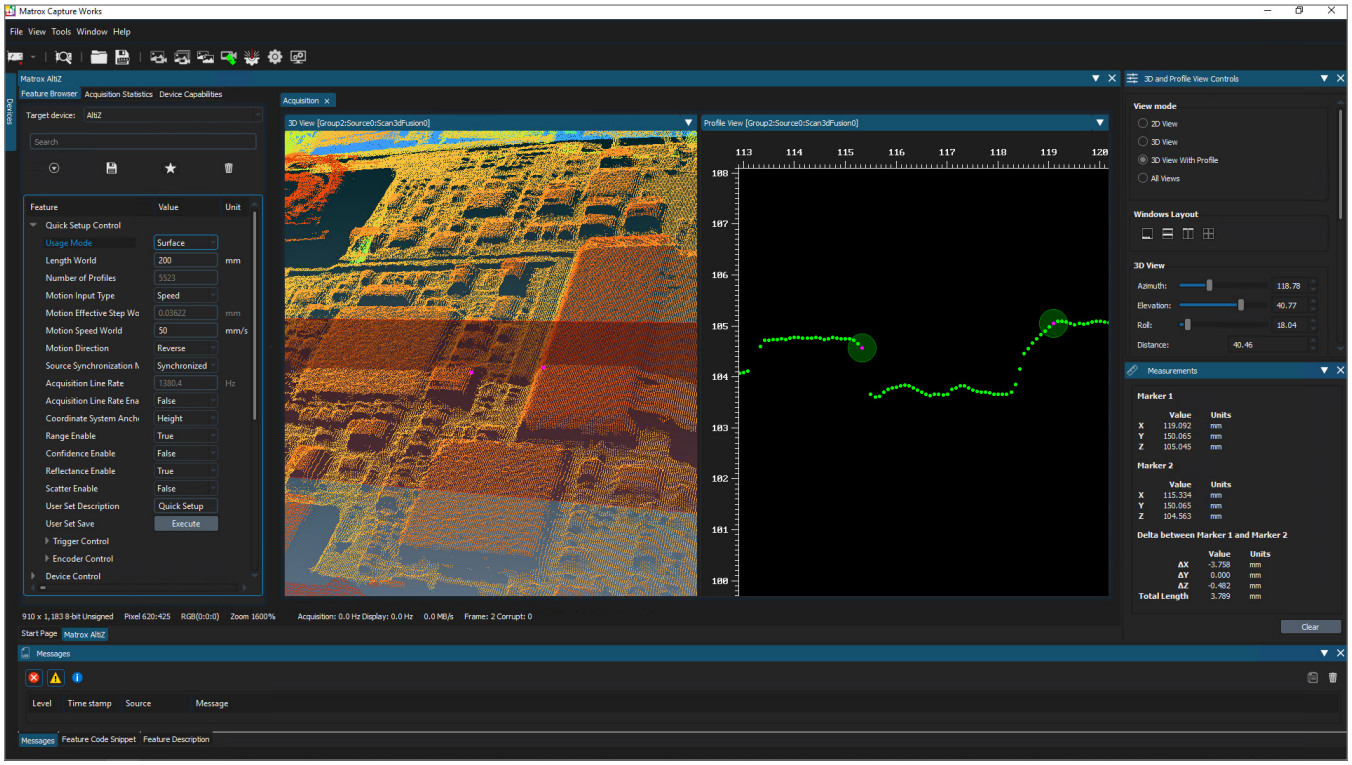
Included in Aurora Imaging Library and Aurora Design Assistant is Aurora Capture Works, an interactive utility for Windows and Linux that enables users to conveniently verify the connection to, as well as configure and test acquisition from, cameras and devices using a GenICam™-based interface standard such as Zebra AltiZ. Aurora Capture Works contains views specific to the Zebra AltiZ for tuning peak (laser line) extraction, configuring the scanning volume, and setting up device triggering.

Third-party software support

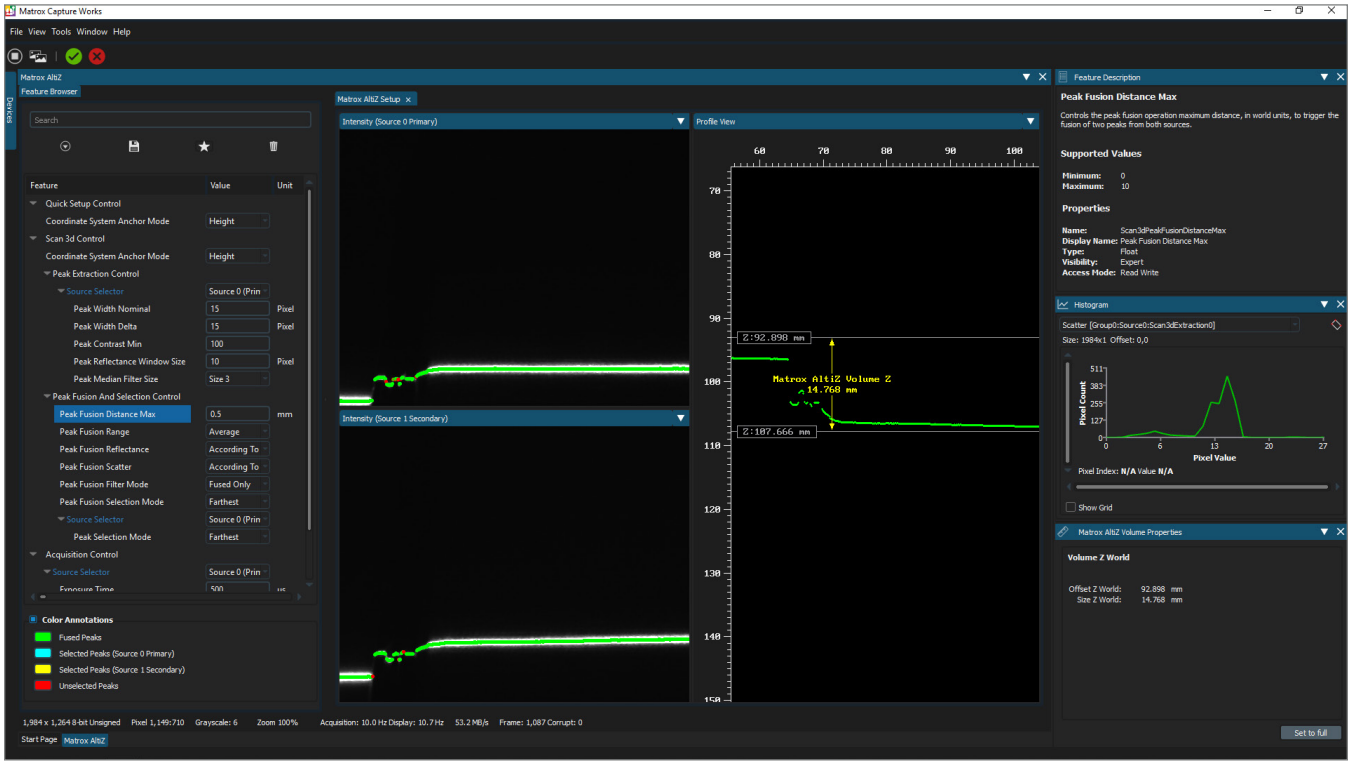
Zebra AltiZ is also compatible with third-party vision software that implements support for the GigE Vision standard, GenICam GenDC specification, and GenICam PFNC 3D pixel formats.

Software Environment (cont.)

Aurora Capture Works interactive utility



3D (point cloud) view with profile at intersecting plane and measurement markers within the Aurora Capture Works interactive utility.



Peak (laser line) extraction, fusion, and volume (Z) adjustment within the Aurora Capture Works interactive utility.

Specifications

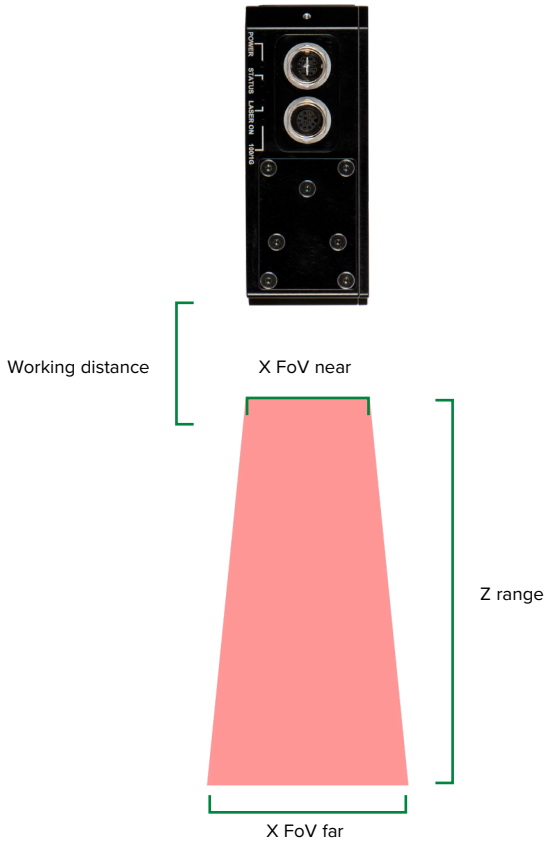
Zebra AltiZ dimensions

Zebra AltiZ fixation points

All holes (except though-holes) are for M4-threaded screws.

Specifications (cont.)

Zebra AltiZ sensing cross-section



Characteristic / Model	AZ1D4SR	AZ1D4SB	AZ1D4MR	AZ1D4LR
Laser color	Red (660 nm)	Blue (405 nm)	Red (660 nm)	Red (660 nm)
Working distance (from reference point)	100 mm	100 mm	185 mm	160 mm
Z range	70 mm	70 mm	225 mm	385 mm
Z resolution (near–far)	4–8 µm	4–8 µm	9.5–34 µm	10–89 µm
X FoV (near–far)	55–75 mm	55–75 mm	85–165 mm	110–310 mm
X resolution	38 µm	38 µm	82 µm	157 µm

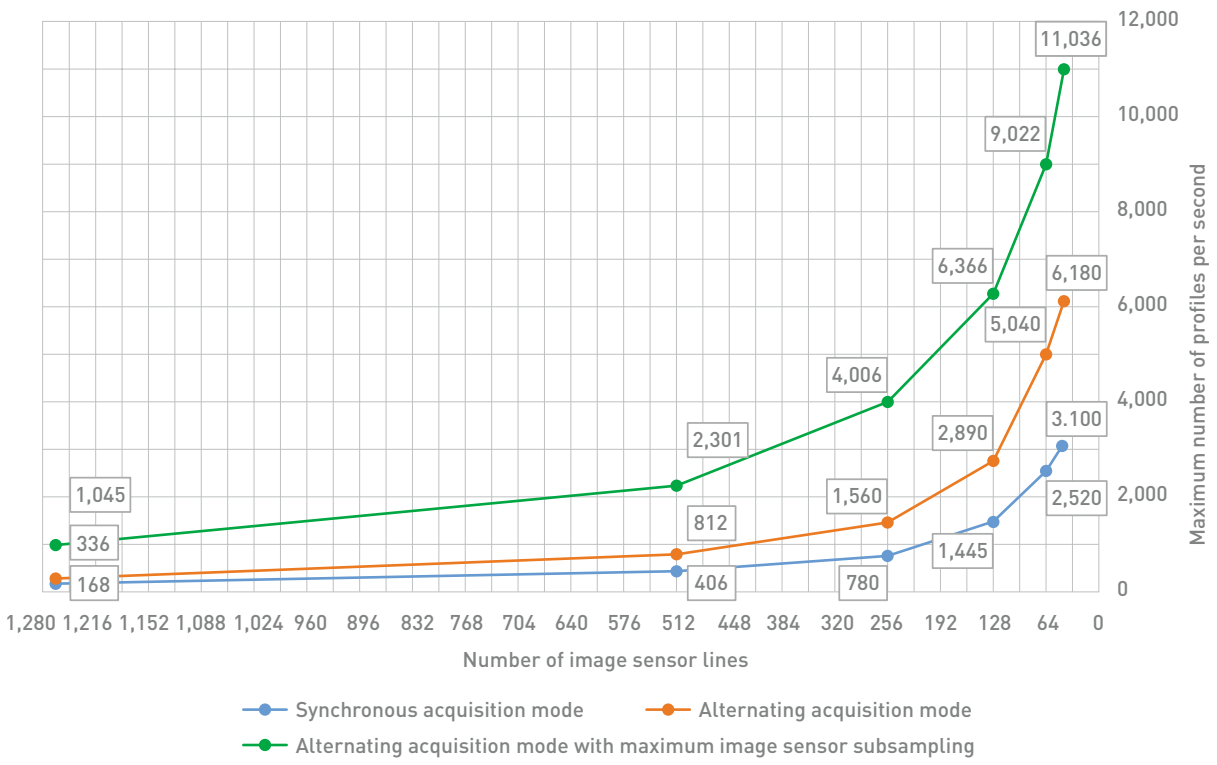
Notes:
- Values are approximate and may vary slightly between 3D sensors of a given model.
- Z resolution values include sub-pixel processing whose effect depends on imaging conditions.
- Subsequent surface analysis can yield accuracy that is a (further) fraction of resolution.

Specifications (cont.)

Zebra AltiZ	
3D profile sensor	
Profiling characteristics	1984 points per profile
	Refer to maximum profile rates chart
Network interface	Gigabit Ethernet
Data and command interface	GigE Vision 2.2[3] with GenDC 1.1
3D data output (SFNC/PFNC)	Profile (RectifiedC/Coord3D_C16 or CalibratedABC_Grid/Coord3D_ABC32f)
	Depth map (RectifiedC/Coord3D_C16)
	Point cloud (CalibratedABC_Grid/Coord3D_ABC32f)
Digital I/Os	Four (4) 24 V isolated inputs
	Two (2) 24 V isolated outputs (5 KHz maximum)
Trigger source(s)	Quadrature encoder with A/B channels
	External input trigger
	Internal object detection trigger
	Internal timers, counters, and/or logic blocks
	External software trigger
Scan type	Single-profile scan
	Fixed-length scan (frame start)
	Variable-length scan (frame active)
Connectors	M12-X 8-pin for network interface and power input
	M12-A 12-pin for digital I/Os and alternate power input
Indicator LEDs	Power, status, laser, and network speed
Power	PoE: connect IEEE 802.3af compliant PSE, 44–57 Vdc, 12 W (default)
	Vaux: connect 24 Vdc +/- 10%, 0.5 A-rated power supply
Dimensions	233 x 121 x 48 mm (9.17 x 4.76 x 1.89 in)
Weight	1.5 Kg (3.3 lbs)
Operating temperature	0°C to 45°C (32°F to 113°F)
Ventilation requirements	Natural convection
Certifications	Refer to certifications table
Compatible software	Aurora Design Assistant

Specifications (cont.)

Zebra AltiZ maximum profile rates



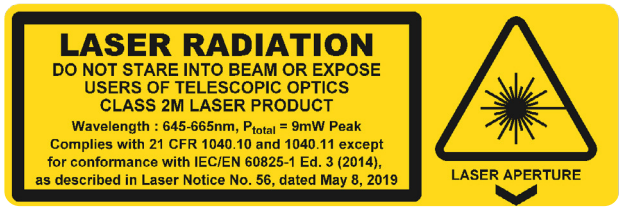
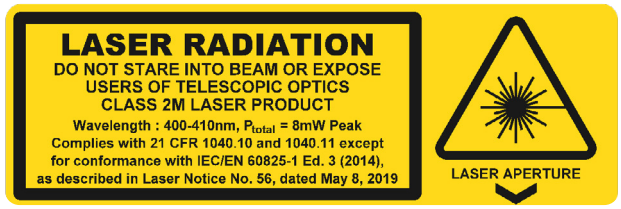
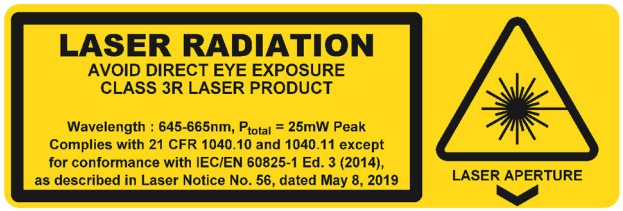
Note: Above values are with a short exposure, with a single peak-per-optical-sensor column, and using a depth-map (RectifiedC) output mode.

Zebra AltiZ conversion table for number of image-sensor lines to height (mm)

Model / Number of lines	48	64	128	256	512	1,264
AZ1D4SR/AZ1D4SB	0.8	2	6.5	15.1	30.5	70
AZ1D4MR	2	7	26	59	112	225
AZ1D4LR	N/A	8	55	130	230	385

Notes:
• Measured at the far end of Z range, using default peak extraction parameters.
• Values are approximate and may vary slightly between 3D sensors of a given model.

Certifications

Zebra AltiZ	
3D profile sensor	
Electromagnetic compatibility	47 CFR Part 15 Class A
	ICES-001 Class A
	EN 55011/EN 61326-1 industrial environment, Class A
Electrical safety	CAN/CSA-C22.2 No. 61010-1-12, UL Std. No. 61010-1 (Third Edition)
Ingress protection	IP67[2] as per IEC 60529:1989+AMD1:1999+AMD2:2013
Laser safety	AZ1D4SR model 
	AZ1D4SB model 
	AZ1D4MR and AZ1D4LR models 

Ordering Information

Part number	Description
Hardware	
AZ1D4SR	Zebra AltiZ 3D profile sensor with a near FoV of 55 mm, range of 70 mm, far FoV of 75 mm, and red (660 nm) laser
AZ1D4SB	Zebra AltiZ 3D profile sensor with a near FoV of 55 mm, range of 70 mm, far FoV of 75 mm, and blue (405 nm) laser
AZ1D4MR	Zebra AltiZ 3D profile sensor with a near FoV of 85 mm, range of 225 mm, far FoV of 165 mm, and red (660 nm) laser
AZ1D4LR	Zebra AltiZ 3D profile sensor with a near FoV of 110 mm, range of 385 mm, far FoV of 310 mm, and red (660 nm) laser
Accessories	
AZ-STARTER-KIT	Zebra AltiZ starter kit. Includes Zebra AltiZ mounting bracket, Ethernet cable, power and I/O cable, and I/O breakout box with its power supply
AZ1/4-20M6MOUNT	Zebra AltiZ mounting bracket. Includes four (4) M4 screws
M12-CBL-PWRIO/3	9.8 ft or 3 m cable to connect alternate power and discrete I/Os. M12 to open end
M12-CBL-ETH/5	16.4 ft or 5 m Ethernet cable. M12 to RJ45 connector
IO-BREAKOUT-BOX	Zebra I/O Breakout Box for digital I/O and power connector for Zebra AltiZ
IO-BOB-AC	60 W AC/DC power adapter for the Zebra I/O Breakout Box
Software	
Included with AZ1D4SR, AZ1D4SB, AZ1D4MR, and AZ1D4LR	Licensed for the Aurora Design Assistant/Aurora Imaging Library Interface (GigE Vision) run-time package. See Aurora Design Assistant and Aurora Imaging Library fact sheets for more information. Aurora Imaging Library - Lite software available for download

Ordering Information (cont.)

Zebra AltiZ Starter Kit

Note: Zebra AltiZ Starter Kit includes a mounting bracket, Ethernet cable, power and I/O cable, and I/O breakout box with its power supply.

Endnotes:
1. The product may be protected by one or more patents; see Patents for more information.
2. Zebra AltiZ functionality limited under IP67 rating conditions.
3. Updated standard pending official release.

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