

# Fast and Precise Inspection, Powered by Cutting Edge AI Technology



# Working together with our customers to create a better manufacturing environment

The technological evolution of the market has made manufacturing demands more complex and diverse, with higher quality requirements. In parallel, labor shortages are only adding to these challenges.

There is an urgent need to not only purchase new manufacturing equipment and improve performance, but also develop and train a skilled workforce able to support production.

In order to respond to these trends, Omron Inspection Systems Division is committed to:

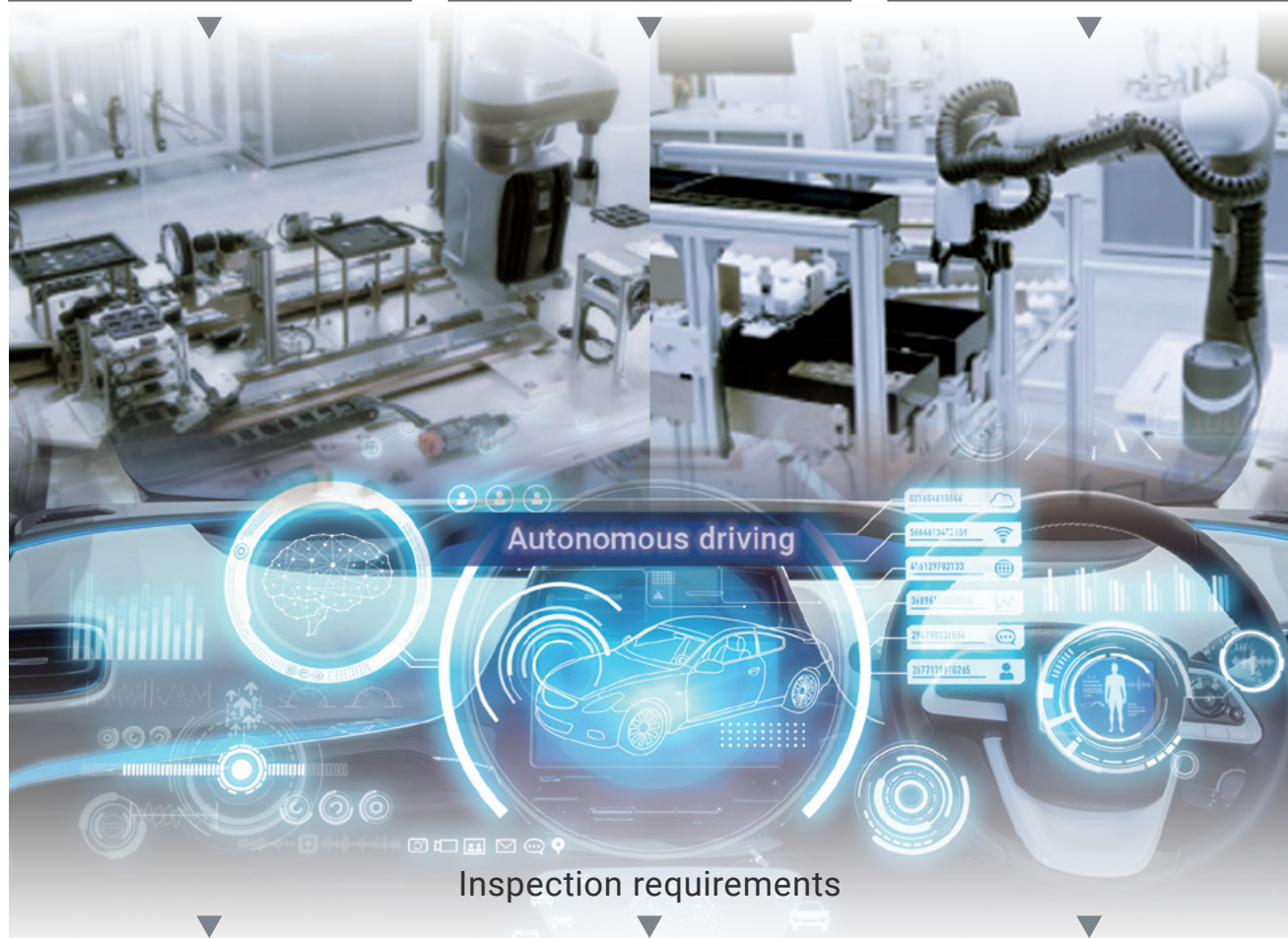
- Zero defect products through reliable, high-precision inspection
- Minimizing programming time and skill through AI and quantitative inspection
- Maximizing good-quality throughput to prevent defects through the utilization of accurate quality data from inspection equipment alongside manufacturing data

## Trends of manufacturing environment

Increasing quality requirements

Labor shortages

Complexity and diversification of substrates




  
Zero defect products

  
Minimizing programming time and skill

  
Maximizing good-quality throughput

# Omron's unique technology achieves the inspection requirements


### Zero overlooking



Imaging technology  
MDMC\*<sup>1</sup>  
illumination+MPS\*<sup>2</sup>

High-precision solder  
shape restoration  
by using AI


### Easy operation for best performance



Quantitative  
inspection library  
based on international  
standards


Auto-programming  
using AI

### Maximizing Good Throughput



M2M\*<sup>3</sup> system

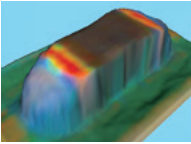
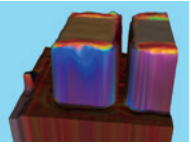
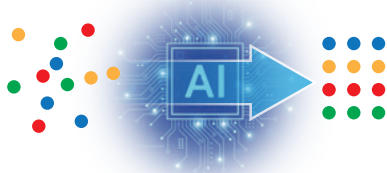
Machine monitoring  
and predictive  
maintenance



VT-S1080-V3/VT-S1040-V3/VT-Z600-V3

\*1. Multi Direction Multi Color  
\*2. Micro Phase Shift  
\*3. Machine to Machine

## Remove tact time bottlenecks and reduce operator related steps and man-hour related inspections.

Faster	With greater accuracy	More easily
<p><b>Fastest 6700mm<sup>2</sup>/sec</b></p> <p><small>*Resolution 12.5μm, when using the new imaging mode</small></p> <p style="text-align: center;">High-speed inspection</p>	<p>Solder protrusion 0.15mm    Chip-to-chip spacing 0.15mm</p> <div style="display: flex; justify-content: space-around;">   </div> <p style="text-align: center;">High-precision shape restoration</p>	 <p style="text-align: center;">AI auto-program</p>

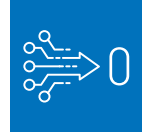
Hardware improvements and a new imaging mode enable speed up of approximately 120%\*<sup>4</sup> compared to the conventional type. We have also added a lineup with a resolution of 10μm, which is compatible with high density and miniaturization of components. In addition, AI automatic program has reduced program creation times by approximately 80%\*<sup>5</sup> compared to the previous model.

\*4. Comparison with VT-S10-V2 Series

\*5. Comparison with software Ver4.05


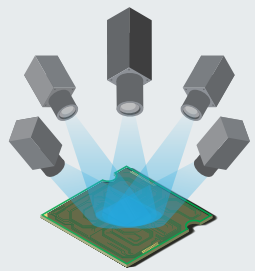
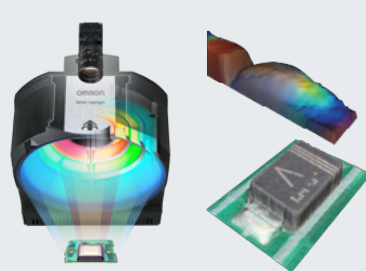


# High-precision solder shape reconstruction helps achieve zero defect products



The combination of Omron's own patented technologies achieves highly robust\*<sup>6</sup> and reliable inspection performance.

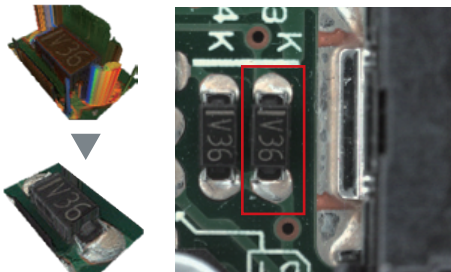
\*6: Excellent filtering of noise that effects the judgement of inspection results such as shadows, secondary reflections, abnormal defect shapes and other uncertain factors.

Latest camera technology	Phase shift+ MPS <sup>9</sup>	MDMC <sup>10</sup> illumination
 <p><b>High-speed, high-quality images</b> Equipped with an OMRON in-house camera optimized for inspection. High-definition images with low noise and strong contrast acquired and inspected at high speed. The inspection speed is about 150%<sup>*8</sup> faster than the conventional one.</p> <p><small>*7: Compared to our VT-S10 series-based verification substrates. *8: CoaXPress 2.0 An interface standard that enables high-speed transmission of large amounts of data.</small></p>	 <p><b>Phase shift+ MPS</b> Equipped with a proprietary design projector. Automatic control of multiple fringe patterns and light intensity realizes optimal inspection. The effect of secondary reflective is also minimized by use of MPS technology.</p> <p><small>*9: Micro Phase Shift</small></p>	 <p><b>Direction lighting + White lighting</b> Equipped with a technique to irradiate multidirectional RGB lights. More high-precision inspection accomplished by capturing variety of shape information even complex fillet shapes. Applied white lighting allows accurate detection and reading of component printing.</p> <p><small>*10: Multi Direction Multi Color</small></p>

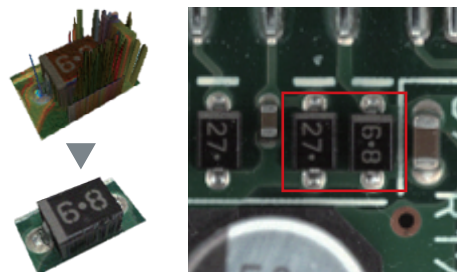
+

Higher accuracy with AI model generated from huge number of images.

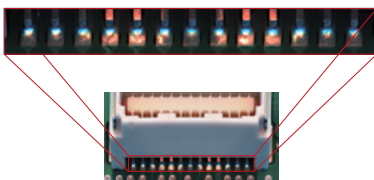
## Noise reduction



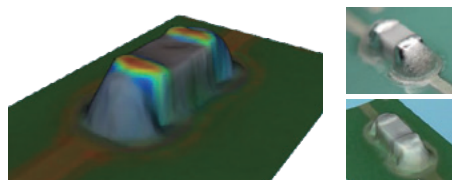
## Reduces the effect of shadows due to large parts



## Visibility even at the connector solder joint



## Stable inspection of microscopic parts



The above images are taken and presented with the permission of a customers from a production board.

For sample image details Please check here.

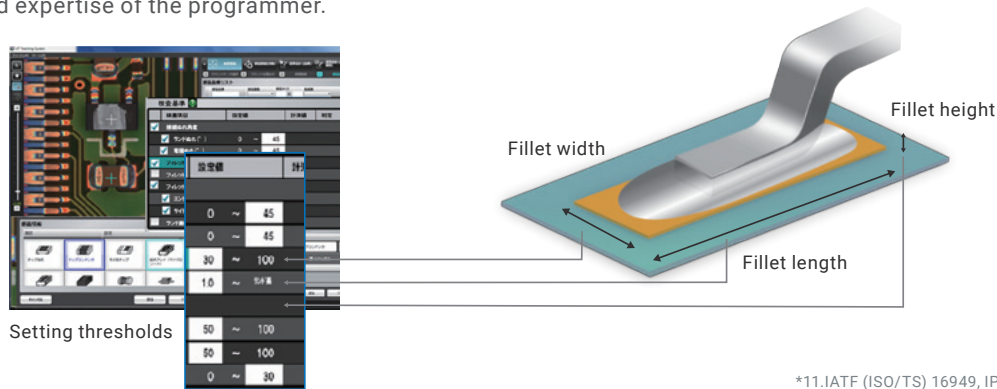


# Minimization of programming efforts by quantitative inspection and AI-assisted qualitative inspection



## Quantative inspection is compliant with international standards<sup>\*11</sup>

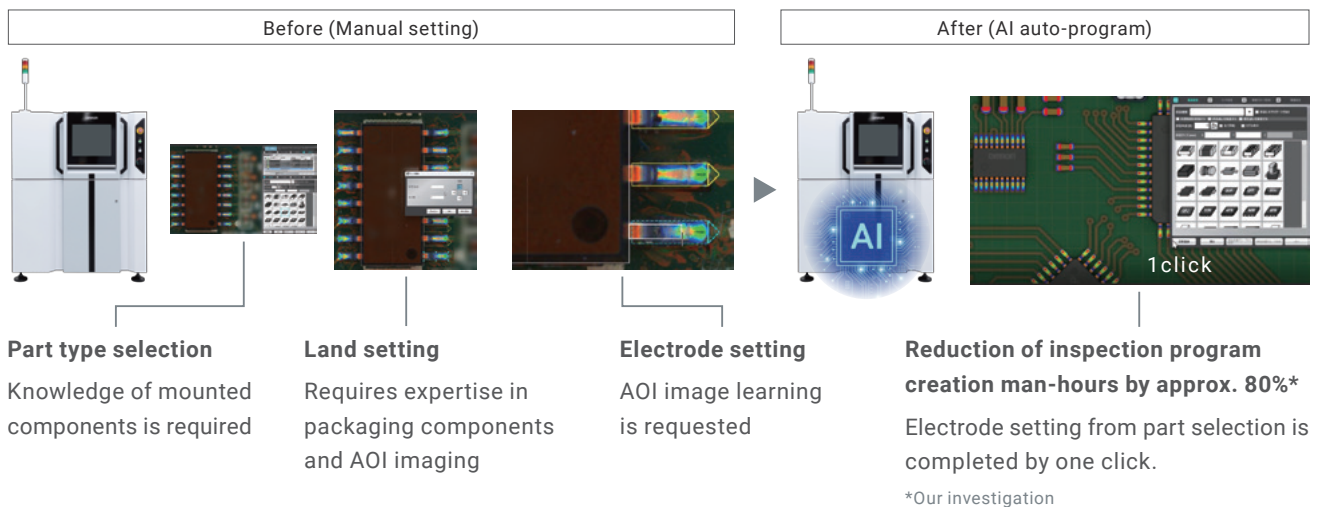
Directly set machine inspection criteria is based on international standards applied as inspection criteria, it doesn't rely on the skill and expertise of the programmer.



<sup>\*11</sup>IATF (ISO/TS) 16949, IPC quality standards, etc.

## AI auto-program

Component types are determined by AI based on the component shapes on the substrates. Reduces man-hours and skills in initial setting of inspection programs by automating window adjustment and setting of reference values, etc.

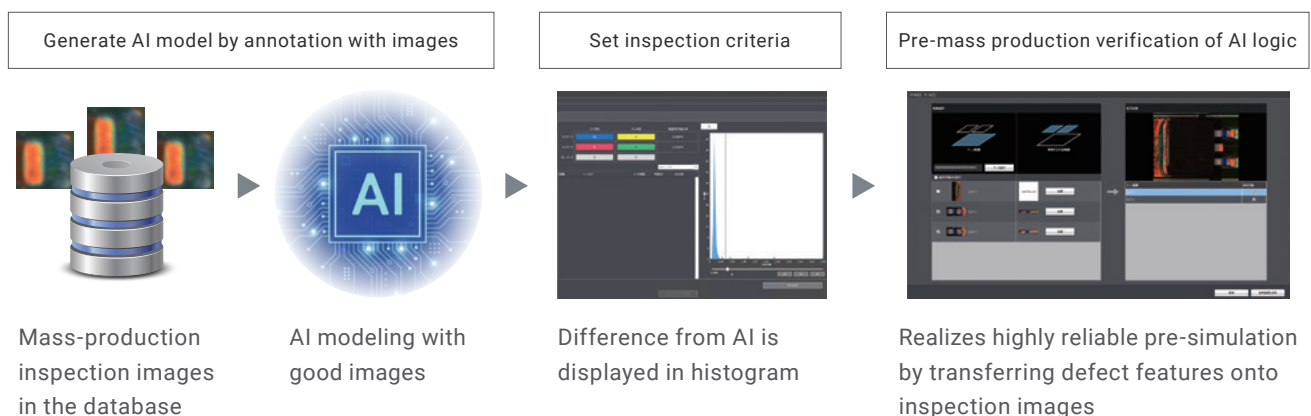


<sup>\*</sup>Our investigation

## AI logic

AI modeling is generated by annotation of good images stored in the server.

After confirming the validity of AI model by simulating it, it can be applied to the inspection.

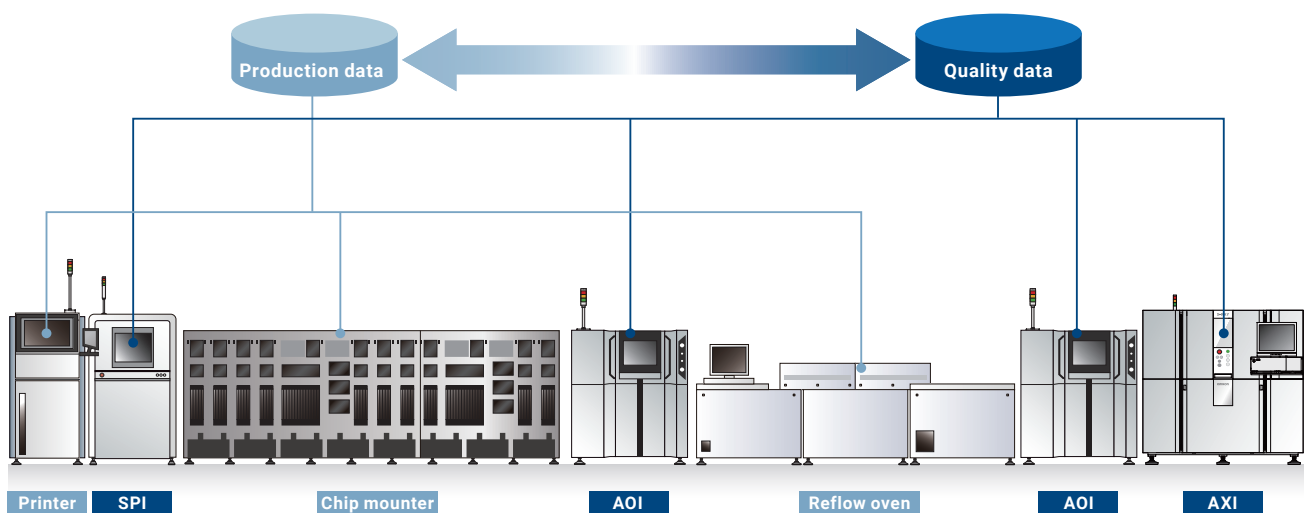


# Maximizing good-quality throughput by using quality focused, M2M system

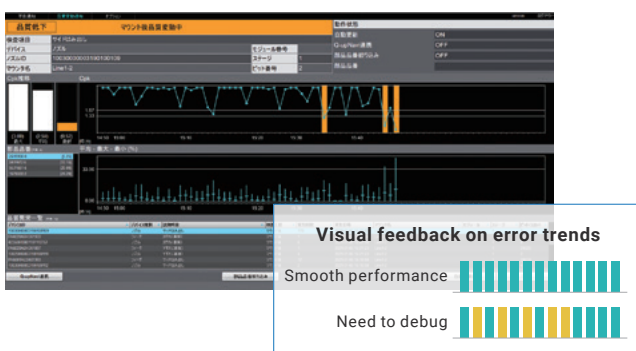


## M2M system

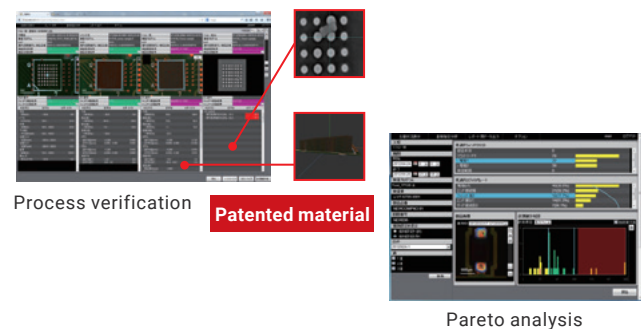
To optimize the quality and equipment operation status without human intervention, made possible by enabling autonomous communication and exchange of information between various connected, production equipment.



### Efficiency of inspection process



### Early identification of factors of defects



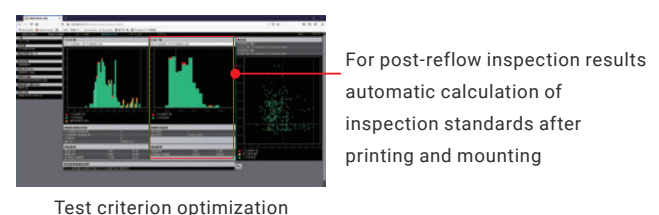
\*SPI/AOI/AXI inspection-system cooperation

### Prevention of defects



\*M2M system requires the license linking to chip mounters.

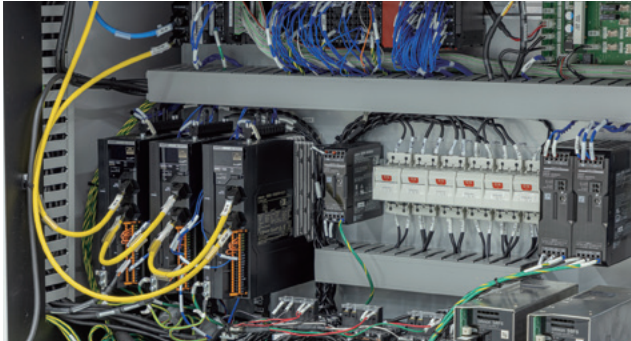
### Improvement of Line Orthogonal Rate



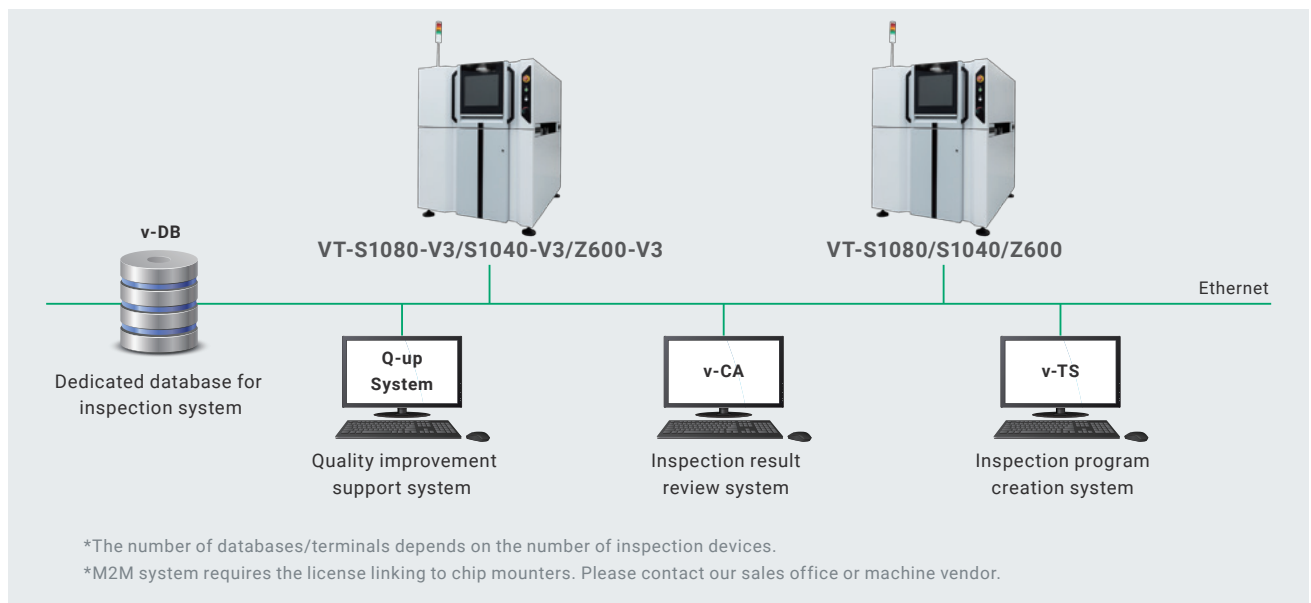
\*The license from CKD is required.

# Zero down time production line with equipment monitoring and predictive maintenance

Equipped with Omron control hardware technology, this system allows real-time collection of information from all the IoT connected devices inside the inspection equipment. It allows the equipment status to be visualized, enabling predictive maintenance and quality traceability.



## System configuration



## VT series product line-up

### PCB inspection system (AOI)



Model: VT-S1080/S1040  
/Z600 series

### High-speed CT automated X-Ray inspection system (AXI)



Model: VT-X750



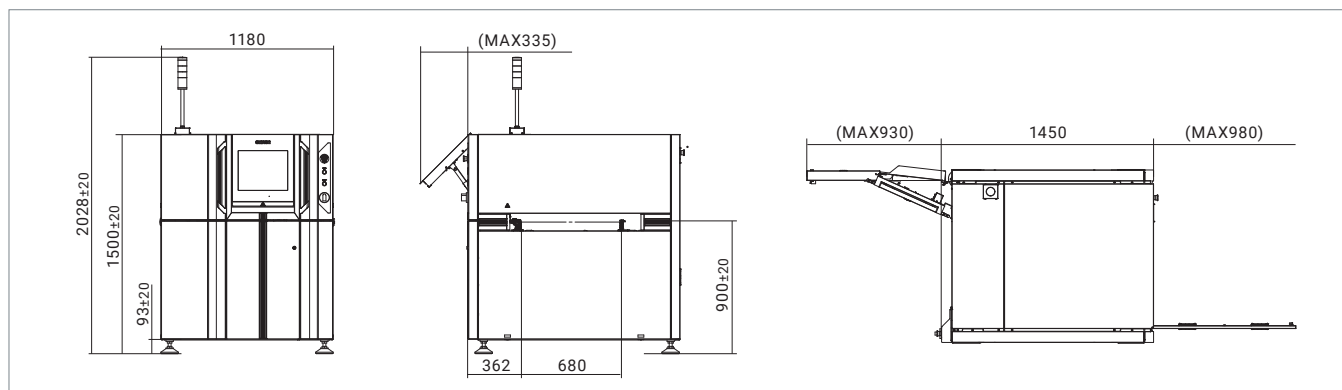
Model: VT-X850



Model: VT-X950



## Outline dimensional drawing



## Hardware configuration / Functional specifications

Type	VT-S1080-V3-R10		VT-S1040-V3-R10		VT-S1080-V3-R12		VT-S1040-V3-R12		VT-Z600-V3-R12	
Outer dimentions		1180(W) × 1450(D) × 1500(H)mm (excluding tower lamp and monitor)								
Weight		Approx. 1240Kg								
Power supply		200 to 240 V AC (Single phase); Voltage fluctuation range ±10% 50/60Hz								
Rated power		2.0 kVA (Maximum current 10 A)								
Line height		900±20mm								
Air supply		Not required								
Operating temperature range		10~35℃								
Operating humidity range		35 to 80% RH (Non-condensing)								
Camera	Direct	25Mpix								
	Oblique	6.4Mpix	—		6.4Mpix	—		—		
Resolution	Direct	10μm			12.5μm					
	Oblique	10μm	—		10μm	—		—		
FOV	Direct	51.2 × 51.2mm			52.5 × 52.5mm					
	Oblique	30.72 × 20.48mm	—		30.72 × 20.48mm	—		—		
Inspection principle		Hybrid 3DShape reconstructionMDMC <sup>*12</sup> illumination+Phase shift (MPS <sup>*13</sup> )	Hybrid 3DShape reconstruction MDMC <sup>*12</sup> illumination+Phase shift (MPS <sup>*13</sup> option)	Hybrid 3DShape reconstruction MDMC <sup>*12</sup> illumination+Phase shift (MPS <sup>*13</sup> )	Hybrid 3DShape reconstruction MDMC <sup>*12</sup> illumination+Phase shift (MPS <sup>*13</sup> option)	2.5D Shape reconstruction MDMC <sup>*12</sup> illumination				
Supported PCB size	Size	Single lane: 50(W) × 50(D)~510(W) × 680(D)mm				Dual lane: 50(W) × 50(D)~510(W) × 330(D)mm				
	Thickness	0.4~4mm								
	Weight	4Kg								
Clearance		Clearance on PCB: 50mm from board surface Clearance under PCB: 50mm from the back of the board (including PCB warpage, deflection, component tolerance, etc.)								
Height measurement range		25.4mm						—		
Inspection item		Component height, lift, tilt, missing or wrong component, wrong polarity, flipped component, OCR inspection, 2D code, component offset (X/Y/rotation), fillet <sup>*14</sup> (height/length, end joint width, wetting angle, side joint length), exposed land, foreign material, land error, lead offset, lead posture, lead presence, solder ball, solder bridge, distance between components, component angle						Missing or wrong component, wrong polarity, flipped component, OCR inspection, 2Dcode, component offset (X/Y/rotation), fillet (height/length, end joint width, wetting angle, side joint length) <sup>*14</sup> , exposed land, foreign material, land error, lead offset, lead posture, lead presence, solder ball, solder bridge, distance between components, component angle		

\*12. MDMC: Multi Direction/Multi Color \*13. MPS: Micro Phase Shift \*14. Post-reflow process only

- The application examples described in this brochure are for reference only. Please check the functions and safety of the equipment before using it
- When using in conditions or environments not described in this brochure, or for applications such as nuclear energy control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment and others that could present a risk to life or property, Omron assumes no guarantee regarding the products except in the case of special product uses identified by Omron or with special agreement.
- When exporting (or providing to non-residents) this product, its parts or technology falling under the categories of export permissions or approved cargo (or technology) stipulated in the Foreign Exchange and Foreign Control Trade Law, an export permission and approval (or permission for service transaction) shall be necessary based on the same law.

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