PCB Inspection System
VT-S1080-V3/S1040-V3/Z600-V3

Fast and Precise Inspection, Powered by Cutting Edge AI Technology

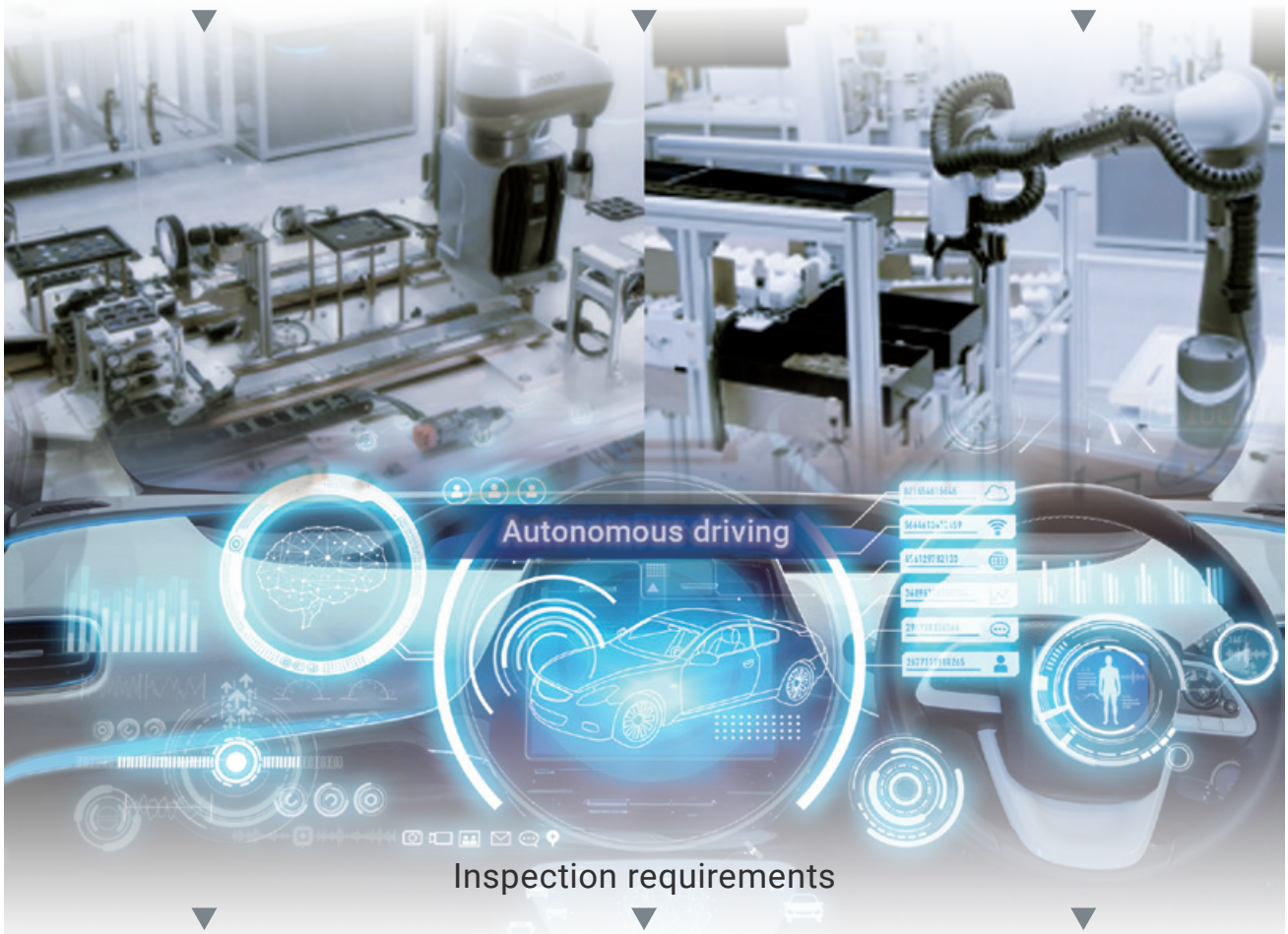
Working together with our customers to create a better manufacturing environment

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



Inspection requirements

Zero defect products	Minimizing programing time and skill	Maximizing good-quality throughput

Omron's unique technology achieves the inspection requirements

Zero overlooking

Imaging technology MDMC[*1] illumination+MPS[*2]

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[*3] 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
Fastest 7000mm²/sec *Resolution 12.5μm	Solder protrusion 0.15mm / Chip-to-chip spacing 0.15mm	AI
High-speed inspection	High-precision shape restoration	AI auto-program

Hardware improvements and a new imaging mode enable speed up of approximately 125%[*4] 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%[*5] compared to the previous model.

*4. Comparison with VT-S10-V2 Series
*5. Comparison with manual creation

High-precision solder shape reconstruction helps achieve zero defect products

The combination of Omron's own patented technologies achieves highly robust*6 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.

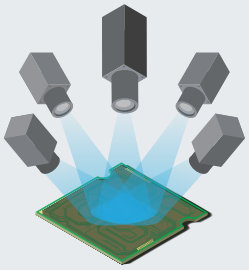
Latest camera technology

High-speed, high-quality images

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%*8 faster than the conventional one.

*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.

Phase shift+ MPS*9

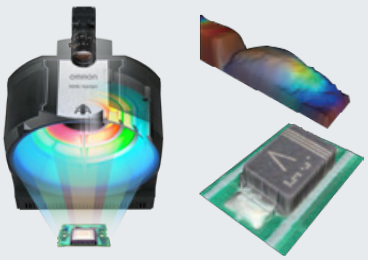


Phase shift+ MPS

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.

*9: Micro Phase Shift

MDMC*10 illumination



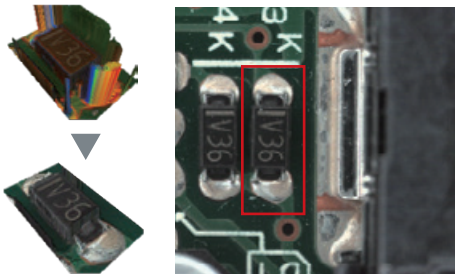
Direction lighting + White lighting

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.

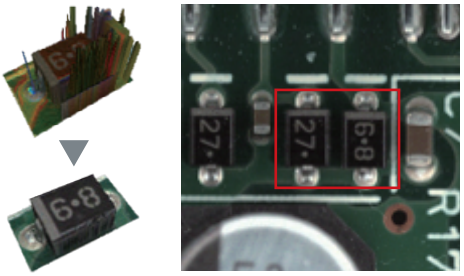
*10: Multi Direction Multi Color

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

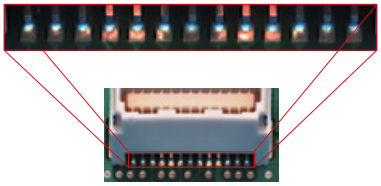
Noise reduction



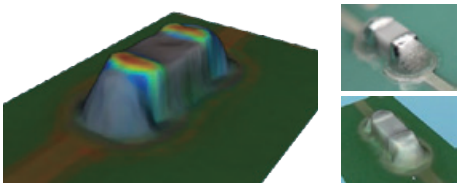
Reduces the effect of shadows due to large parts



Visibility even at the connector solder joint



Stable inspection of microscopic parts



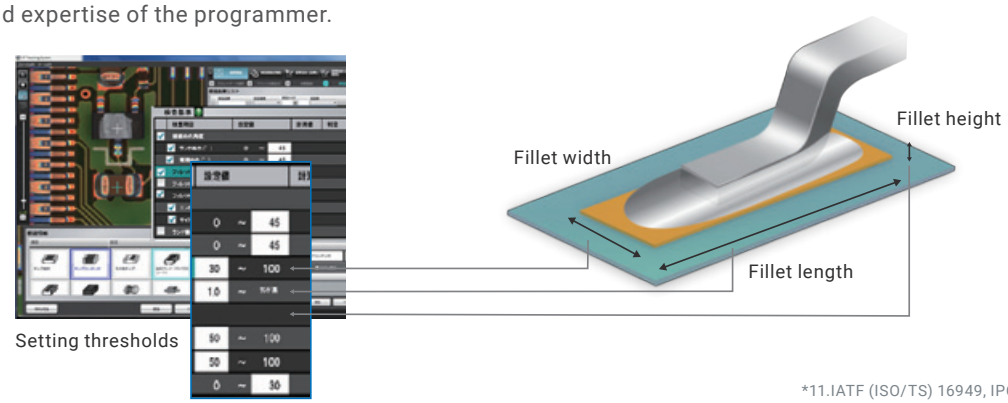
The above images are taken and presented with the permission of a customers from a production board.

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*11

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

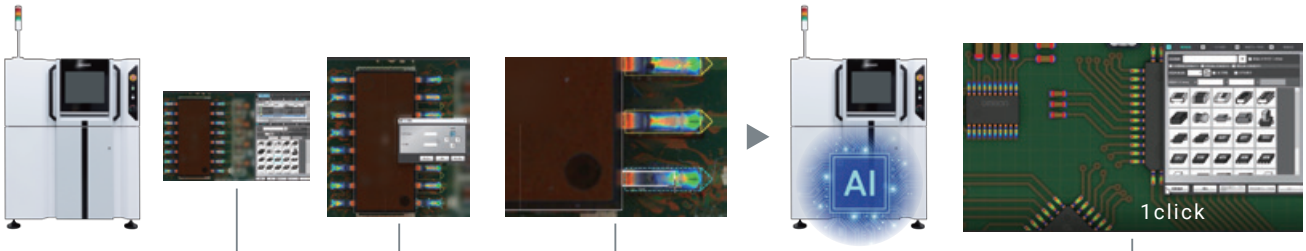


*11.IATF (ISO/TS) 16949, IPC quality standards, etc.

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.

Before (Manual setting) | After (AI auto-program)



Part type selection

Knowledge of mounted components is required

Land setting

Requires expertise in packaging components and AOI imaging

Electrode setting

AOI image learning is requested

Reduction of inspection program creation man-hours by approx. 80%*

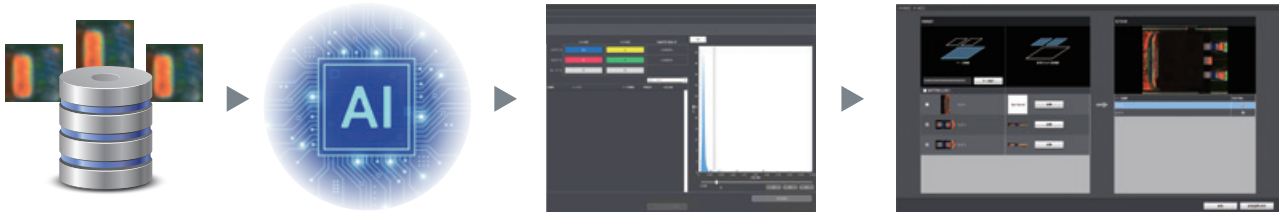
Electrode setting from part selection is completed by one click.

*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.

Generate AI model by annotation with images | Set inspection criteria | Pre-mass production verification of AI logic



Mass-production inspection images in the database

AI modeling with good images

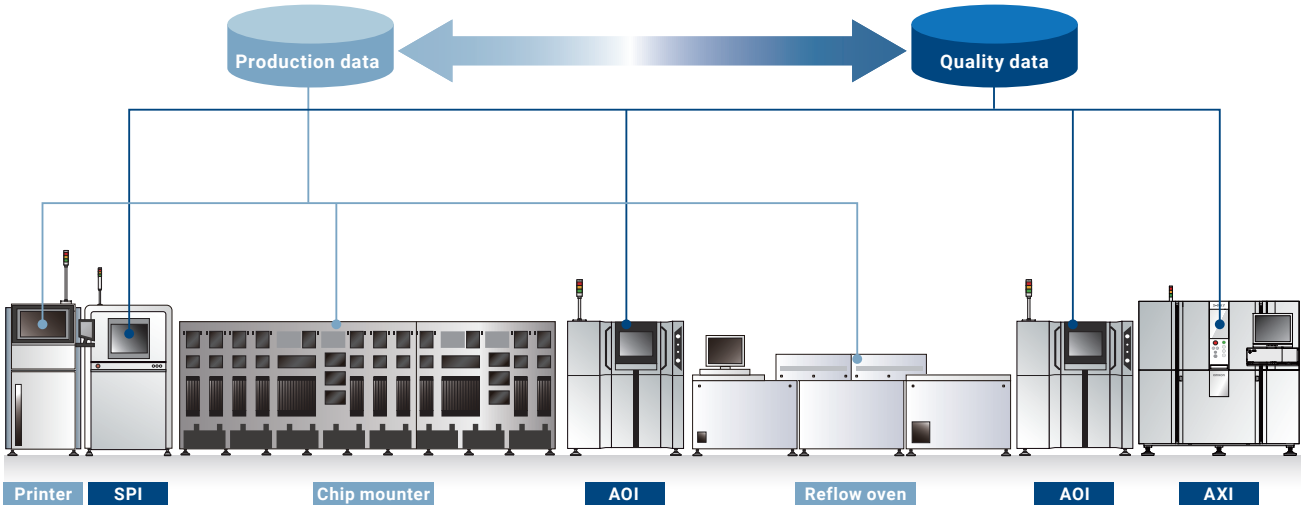
Difference from AI is displayed in histogram

Realizes highly reliable pre-simulation by transferring defect features onto inspection images

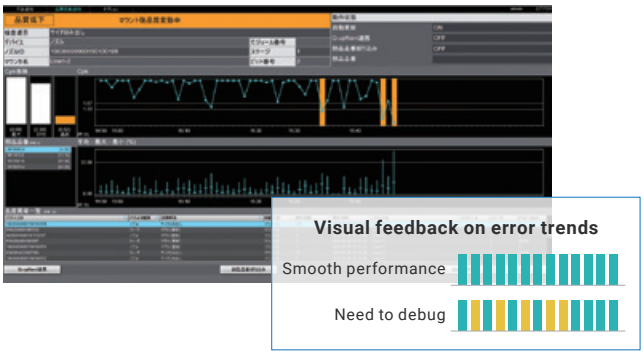
Maximizing good-quality throughput by using quality focused, M2M system

M2M system

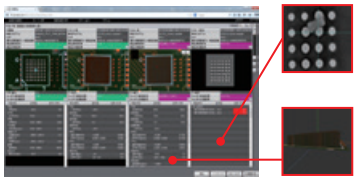
To optimize the quality and equipment operation status without human intervention, made possible by enabling autonomous communication and exchange of information between various connected, production equipment.



Efficiency of inspection process



Early identification of factors of defects



Process verification

Patented material

Pareto analysis

*SPI/AOI/AXI inspection-system cooperation

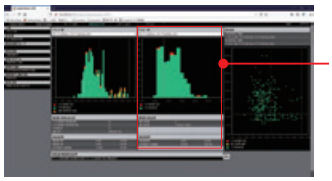
Prevention of defects

Head, nozzle, etc.
For each device
Visualization of defect trends

Process quality trend analysis

*M2M system requires the license linking to chip mounters.

Improvement of Line Orthogonal Rate



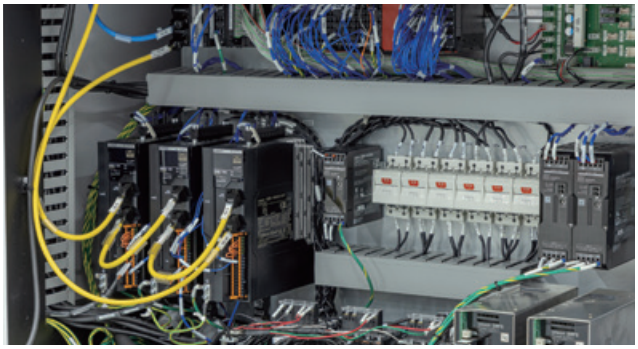
For post-reflow inspection results automatic calculation of inspection standards after printing and mounting

Test criterion optimization

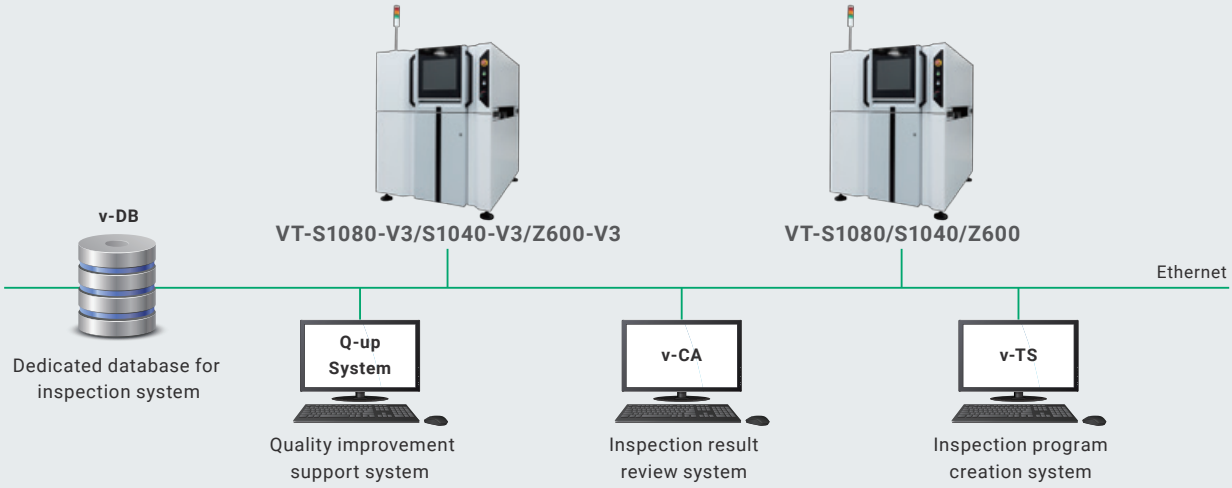
*The license from CKD is required.

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



*The number of databases/terminals depends on the number of inspection devices.
*M2M system requires the license linking to chip mounters. Please contact our sales office or machine vendor.

VT series product line-up

PCB inspection system (AOI)

Model: VT-S1080/S1040 /Z600 series

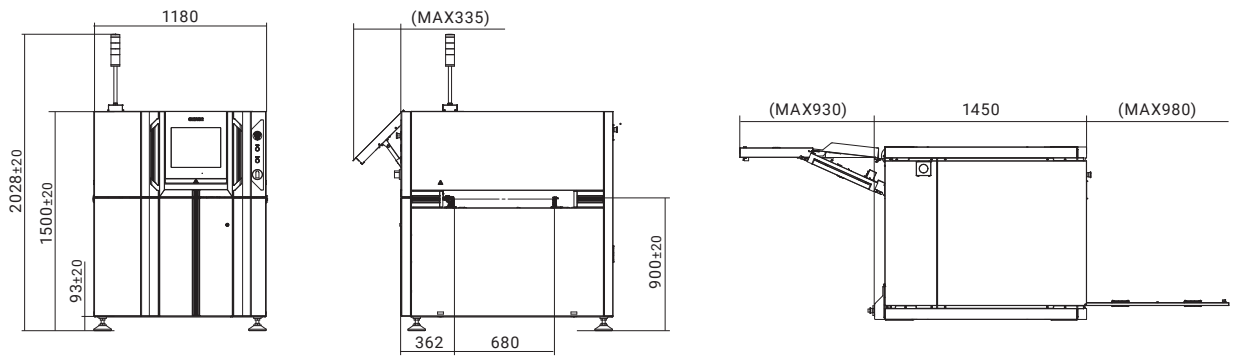
High-speed CT automated X-Ray inspection system (AXI)

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	5Mpix	—	5Mpix	—	—
Resolution	Direct	10μm		12.5μm		
	Oblique	10μm	—	10μm	—	—
FOV	Direct	51.2 × 51.2mm		52.5 × 52.5mm		
	Oblique	25.9 × 19.4mm	—	25.9 × 19.4mm	—	—
Inspection principle		Hybrid 3DShape reconstructionMDMC*12 illumination+Phase shift (MPS*13)	Hybrid 3DShape reconstruction MDMC*12 illumination+Phase shift (MPS*13 option)	Hybrid 3DShape reconstruction MDMC*12 illumination+Phase shift (MPS*13)	Hybrid 3DShape reconstruction MDMC*12 illumination+Phase shift (MPS*13 option)	2.5D Shape reconstruction MDMC*12 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*14 (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)*14, 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.
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OMRON Corporation

INDUSTRIAL AUTOMATION COMPANY
INSPECTION SYSTEMS BUSINESS DIVISION
SALES DEPARTMENT
Shinagawa Front Bldg. Conference 7F
2-3-13 Kounan Minato-ku Tokyo
108-0075 JAPAN
TEL +81-3-6718-3550 FAX:+81-3-6718-3553

OMRON INDUSTRIAL AUTOMATION (CHINA) CO., LTD.
F20,TowerA,NEO Building,6011ShennanAvenue,
Futian District, Shenzhen, Guangdong 518048, China
TEL:+86-755-8359-9028 FAX:+86-755-8359-9628

Omron AOI Business Europe, Omron Europe B.V.
Zilverenberg 2, 5234 GM 's-Hertogenbosch,
The Netherlands
TEL:+31(0)736 481811 FAX:+31(0)736 481879

OMRON TAIWAN ELECTRONICS INC.
9F-1, No.8, Ziqiang S. RD., Zhubei City, Hsinchu County 302, Taiwan R.O.C.
TEL: +886-3-667-5557 FAX: +886-3-667-5558

OMRON ELECTRONICS KOREA CO.,LTD.
21F, KyoboTower B Wing, 465, Gangnam-daero,
Seocho-gu, Seoul, Korea 137-920
TEL:+82-2-3483-7789 FAX:+82-2-3483-7788

Omron Asia Pacific Pte Ltd
438B Alexandra Road #08-01/02
Alexandra Technopark, Singapore 119968
Tel:(65)6835-3011 Fax:(65)6835-2711

Omron Automation Pvt. Ltd.
The Qube, 5th Floor, Unit No. 501-504 MV Road,
Marol, Andheri (East), Mumbai – 400 059, India
Fax: (91-22) 7115 5602

OMRON ELECTRONICS LLC
2895 Greenspoint Parkway, Suite 200,
Hoffman Estates, IL 60169, U.S.A
TEL:(1) 847-843-7900 FAX:(1) 847-843-7787

Authorized Distributor: