KEYENCE

96M16498

3D Surface Profiler

Quick Start Guide

- Average Step Height Measurement (Flatness) -

KEYENCE CORPORATION

Introduction

Thank you for your purchase of the VK-X3000 Series 3D Surface Profiler.
First, we will introduce basic operation.
You can understand basic operation using a common object such as a coin.

This manual describes average step height measurement of 3D data gathered by the VK-X3000.

The average step height measurement tool is a function to gather height difference, maximum height, minimum height, and flatness.

Contents

Chapter 1

Before Starting Operation

1-1 Understanding the Operation Flow

The operation flow of the VK-X3000 Series is as follows.

Step 1: New data acquisition → Obtain a 3D image by measuring a sample
Step 2: Measurement preprocessing → Remove the tilt and noise of the obtained 3D image
Step 3: Use the measurement function → Measure preprocessed data using various functions
Step 4: Export measurement result → Output a measurement result to a report or Excel

This manual describes the Step 3 and Step 4.

Step 1

New data acquisition

↓

Step 2

Measurement preprocessing

↓

Step 3

Reference plane settings

▽

Setting measurement area

↓

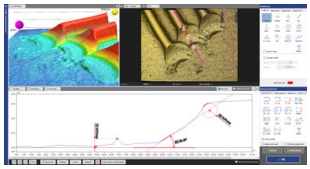
Step 4

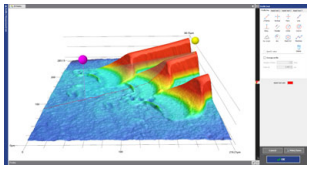
Exporting measurement result

● **New data acquisition**
Measure an object and obtain a 3D image including color information.
For details, see 📖 "Quick Start Guide: Gathering New Data using Focus Variation/White Light Interferometer", and 📖 "Quick Start Guide: Gathering New Data using Laser Confocal".

● **Measurement preprocessing**
For details, see 📖 "Quick Start Guide: Image Processing".

● **Using the measurement function**
Perform various measurements from an obtained 3D image.
- Cross section shape measurement
- Roughness measurement
- Comparison of two types of data
- Film thickness measurement



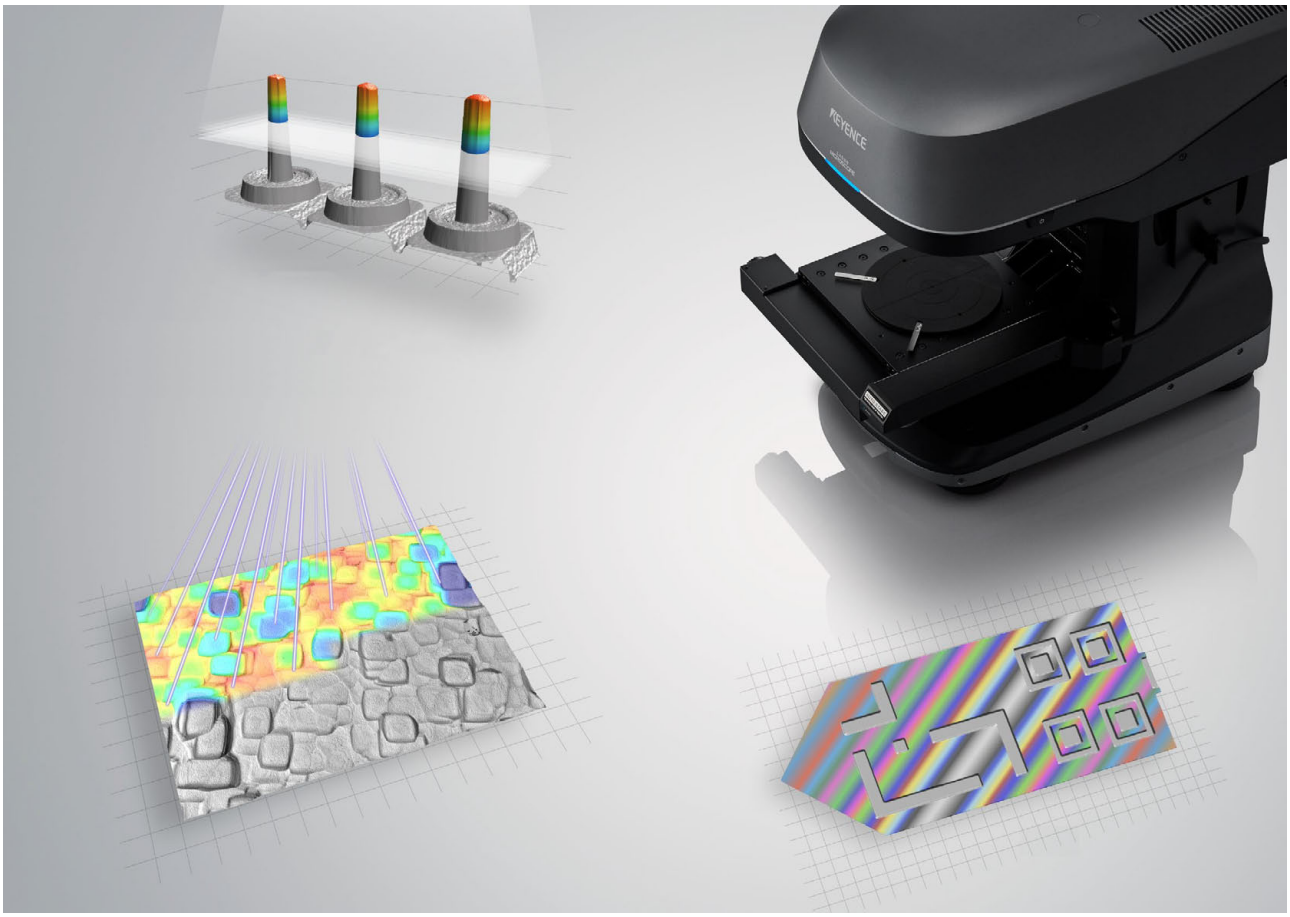


● **Reference plane settings**
Set a reference plane for the measurement area to measured data.
These are called "Reference area" for the VK-X3000 Series.

● **Setting measurement area**
Set a position you want to measure to the measured data.

Chapter 2

Conducting Average Step Height Measurement (flatness)

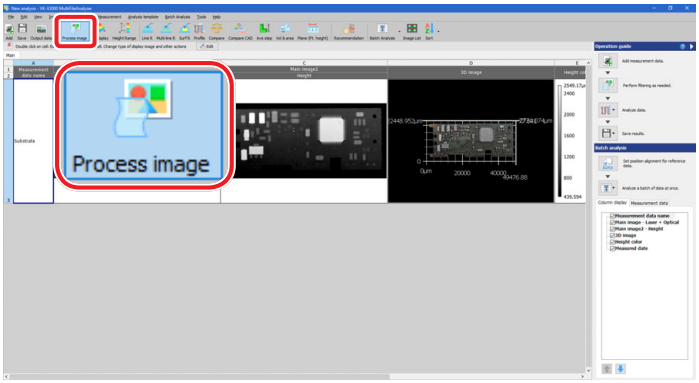


2-1 Setting the Reference Plane

Set a surface to be referred to for measurement (reference plan) in the height data.
The entire height data is rotated so that the determined reference surface is horizontal, and the height data is offset in the height direction so that the height of the reference plane is zero (0).

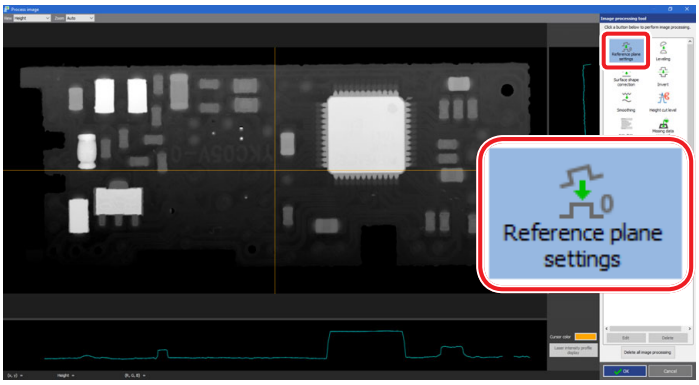
1. Select measurement data and click the [Process image] button.

Click the [Process image] button on the toolbar. Alternatively, select [Process image] from the [Process image] menu.



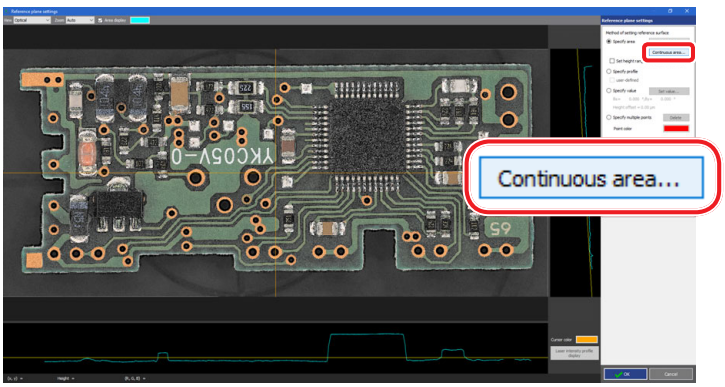
2. Click the [Reference plane settings] button.

The [Reference plane settings] window appears.

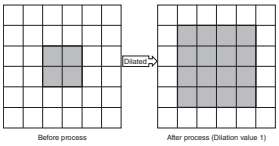


3. Click the [Specify area] radio button in [Method of setting reference surface], and then click the [Continuous area...] button.

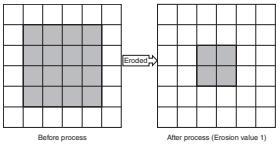
The [Area settings] window appears.



● **Area inflation**
Dilates the border of an area by the pixels set for dilation.
Use this for fine adjustment of the range selected first when specifying an area.

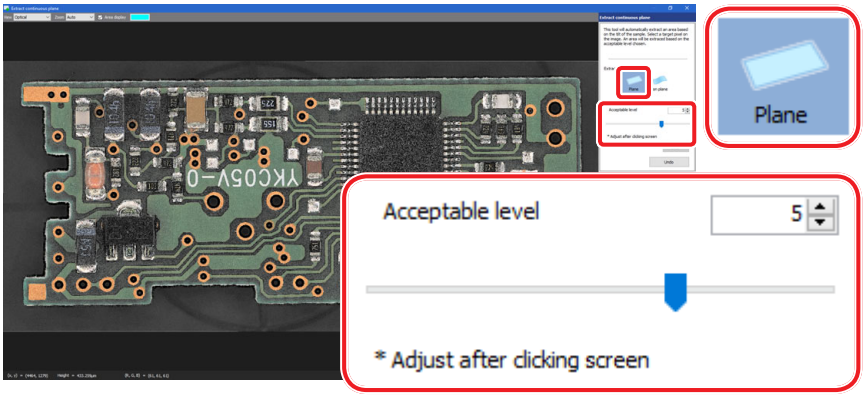


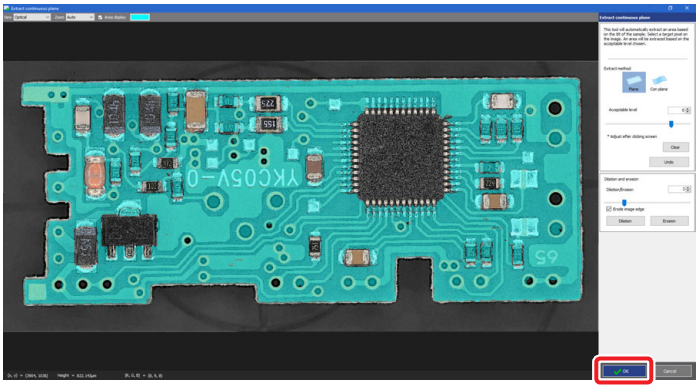
● **Area deflation**
Removes the border of an area by the pixels set for erosion, and reduces it.
Use this for fine adjustment of the range selected first when specifying an area.



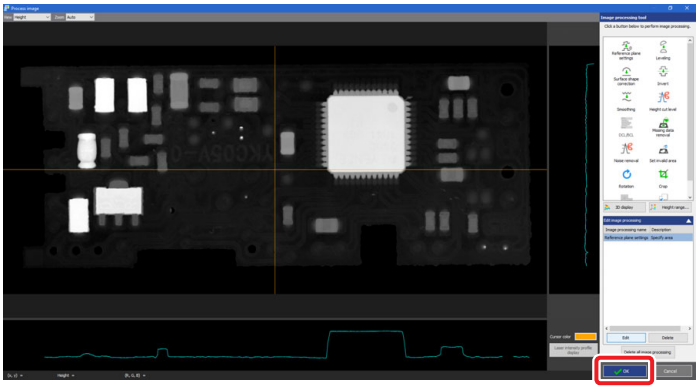
4. Click an area setting button for figure drawing and set an area on the image.

Click the [Plane] button. Adjusting the acceptable level and clicking an arbitrary point on the image display the area with the range specified. Click the [OK] button to set it.
As needed, click any of points on the screen.





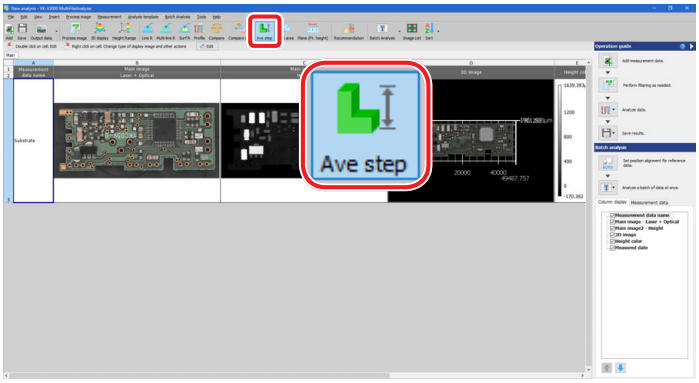
5. Check that a reference plane has been specified, and click the [OK] button.



The [Reference plane settings] window closes, and the results of the processing are reflected in the image processing window.

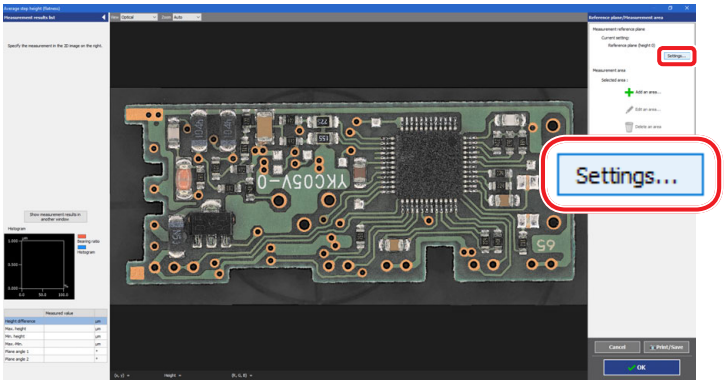
6. Select the average step height measurement (flatness).

Select [Average step height (flatness)] from the [Measurement] menu. Or click the [Ave step] button on the toolbar.



7. Set the screen for setting the plane to be the reference for measurement.

Click the [Settings] button of the [Measurement reference plane] on the top right of the screen.



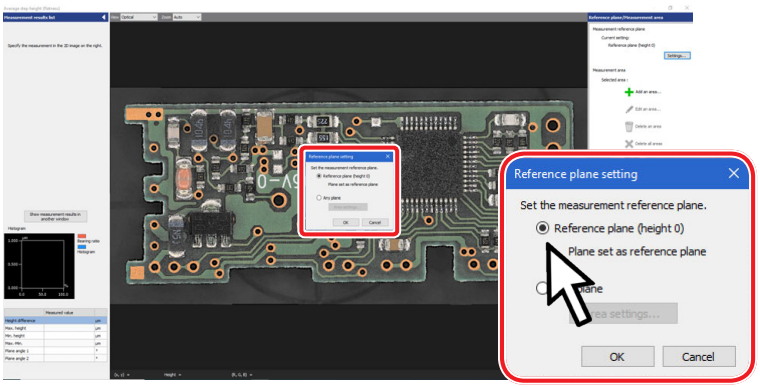
● **Reference plane settings**
In the VK-X3000 series, the function to set a reference plane for measurement to the obtained 3D image data is called "Reference plane settings".

- **Reference plane (height 0)**
  The plane set in the reference settings for image processing is used as reference area.
  It is convenient to compare the place and step height specified in reference plane settings.

- **Free surface**
  Click the [Area settings] button and specify a reference area.
  You can calculate the flatness of an arbitrary plane you select, and the parallelism between arbitrary planes.

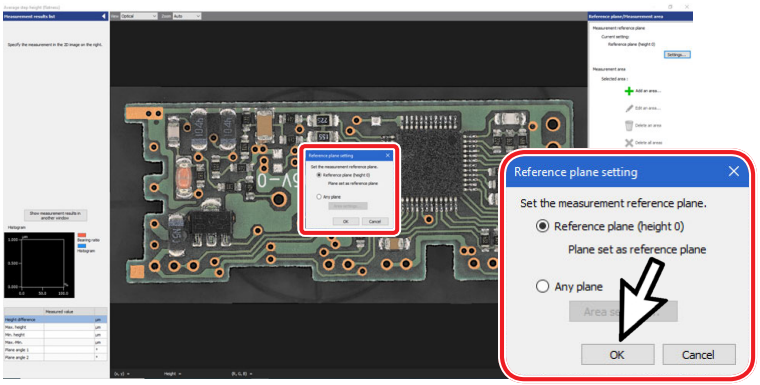
8. Set a reference plane for measurement.

In this case, click the [Reference plane (height 0)] radio button.



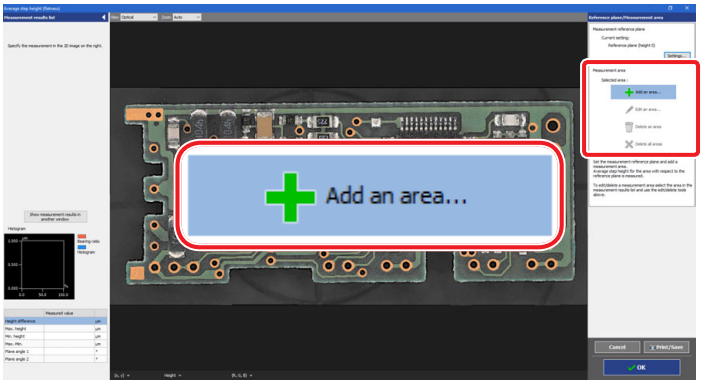
9. Click the [OK] button.

Click the [OK] button to set the reference plane.



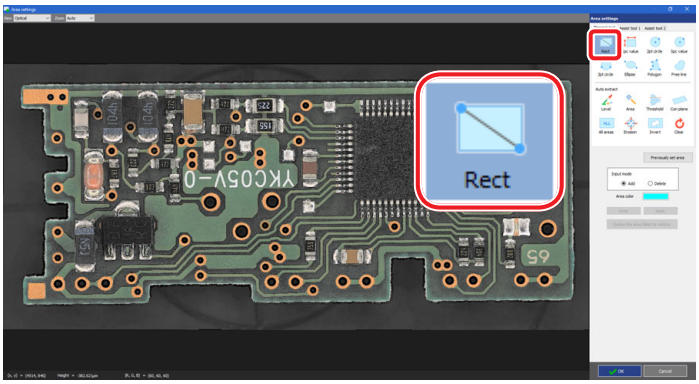
1. Select adding an area.

Click [Add an area] from [Measurement area] on the right middle of the screen.



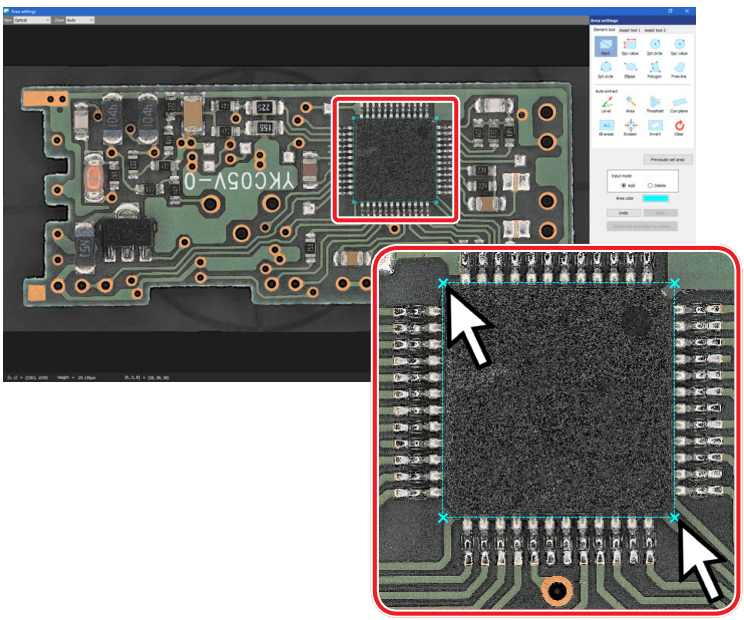
2. Click the [Rect] button from [Element tool].

Click the [Rect] button from [Element tool] on the top right of the screen.



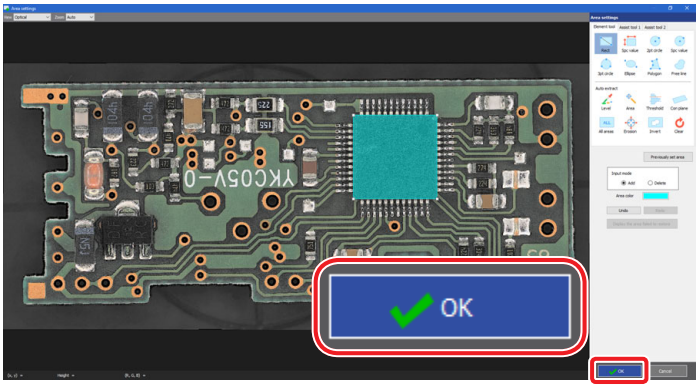
3. Select the range you want to select in the measurement data screen.

Click the top left (start point) of the range you want to select, move the cursor, and click the bottom right (end point) in the measurement data screen.



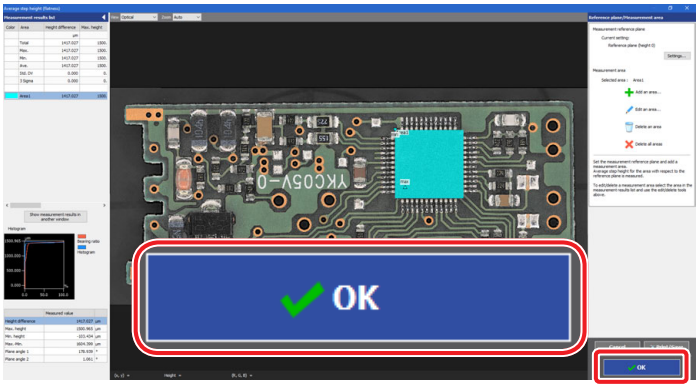
4. Click the [OK] button.

Click the [OK] button to set the area.



5. Click the [OK] button.

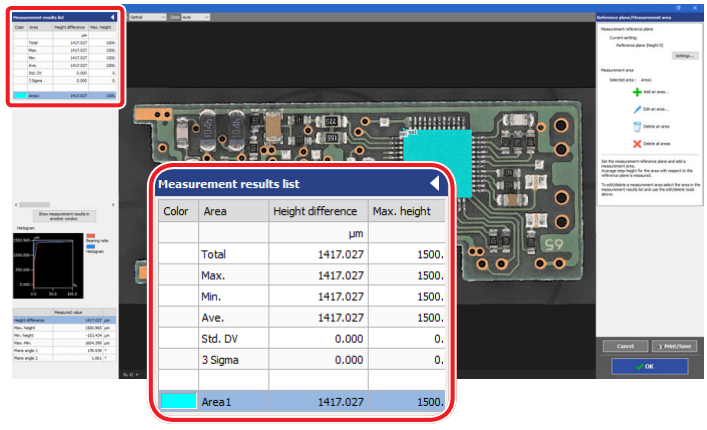
Click the [OK] button to set the measurement area.



6. Check that the measurement results are displayed.

The measurement results appear in [Measurement results list] on the left side of the screen.

The operation is complete.

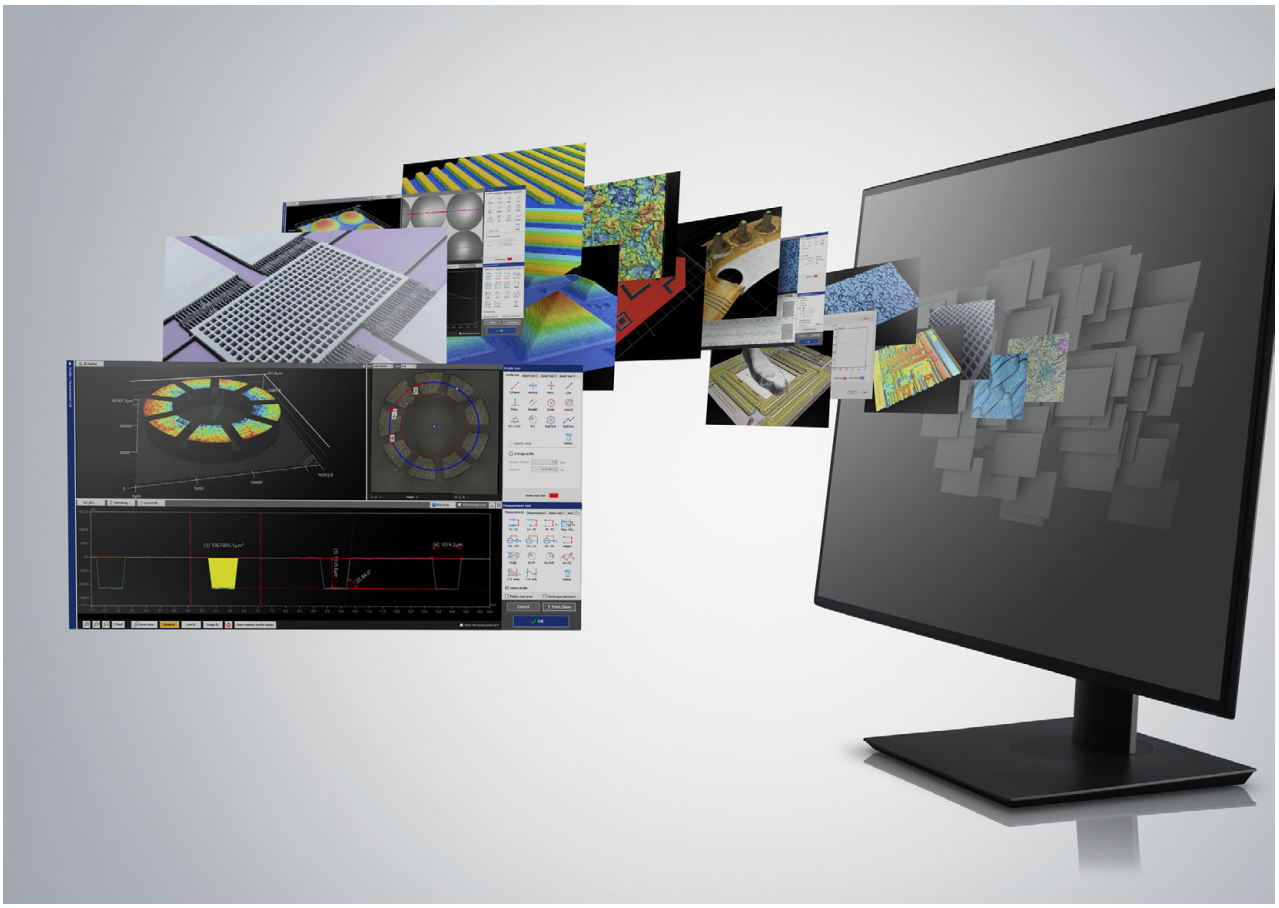


To set multiple areas, repeatedly set them from step 1.

MEMO

Chapter 3

Advanced Settings

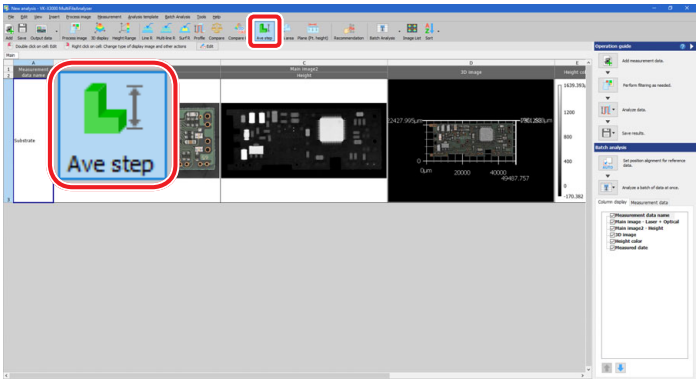


3-1 Setting the Free Surface to the Reference

Set a surface where an arbitrary area is referred for measurement (reference plane).
The entire height data is rotated so that the determined reference surface is horizontal, and the height data is offset in the height direction so that the height of the reference plane is zero (0).

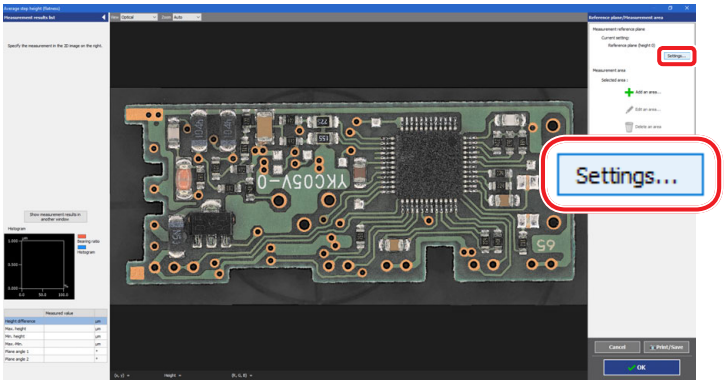
1. Select the average step height measurement (flatness).

Select [Average step height (flatness)] from the [Measurement] menu. Alternatively, click the [Ave step] button on the toolbar.



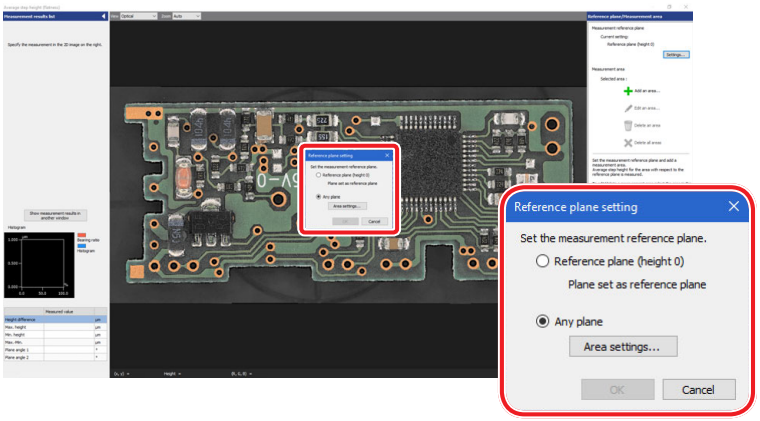
2. Set the screen for setting the plane to be the reference for measurement.

Click the [Settings] button of the [Measurement reference plane] on the top right of the screen.



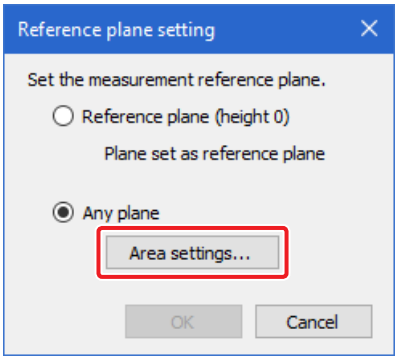
3. Set a reference plane for measurement.

In this case, click the [Any plane] radio button.



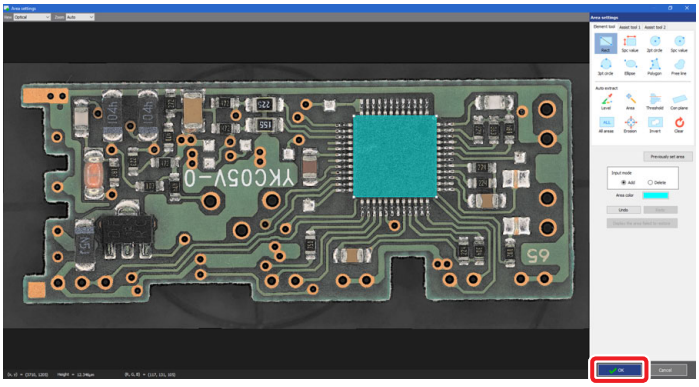
4. Click an area setting button for figure drawing and set an area on the image.

The [Area settings] window appears.



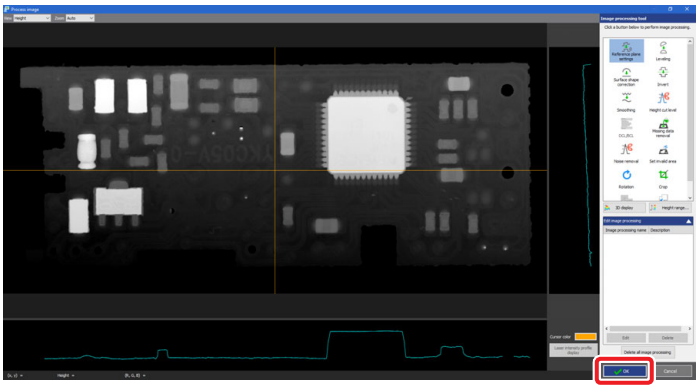
5. Set an area on the screen, and click the [OK] button.

Click the [Rect] button. Click the mouse at the first point of the rectangle, and move the mouse. Next, when clicking the second apex of the rectangle, the rectangle specified with the range is set as an area.

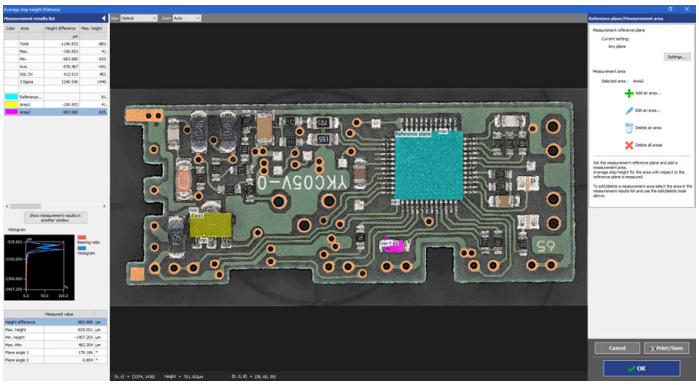


6. Click the [OK] button in the [Reference plane setting] window.

The [Reference plane settings] window closes, and the results of the processing are reflected in the image processing window.

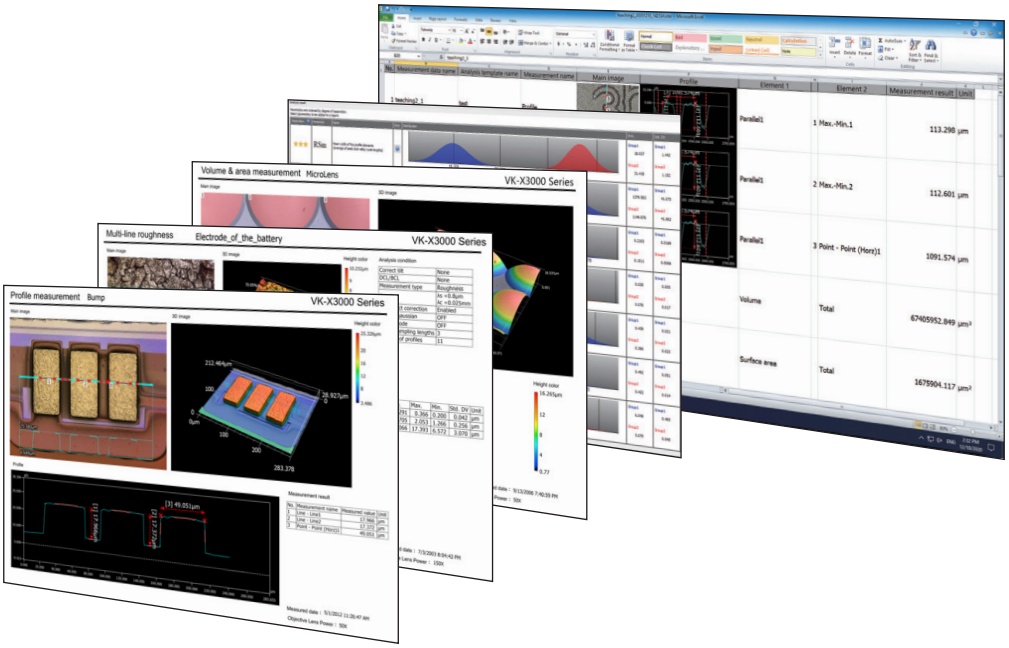


7. **Set another area using the same procedure, if relevant.**



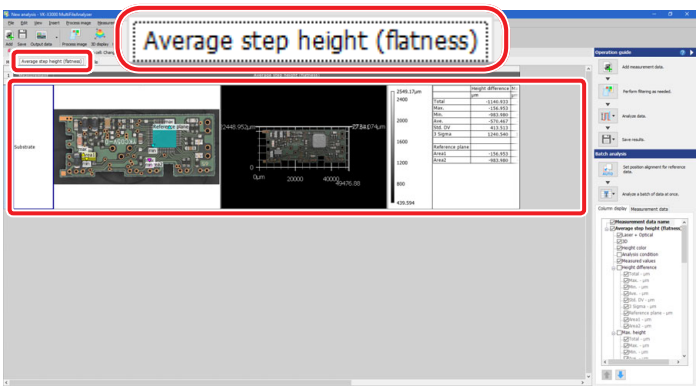
Chapter 4

Exporting Measurement Result



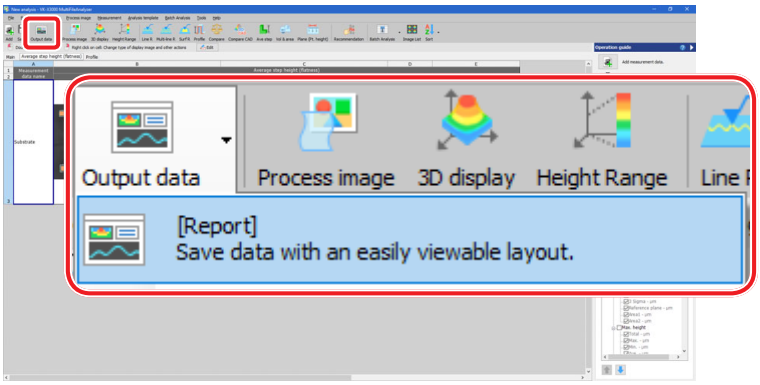
You can display a report of measurement results by the Multifile Analyzer in another window. For the report, its layout can be edited and file can be output.

1. Select the grid sheet including the measurement result you wish to display in report.

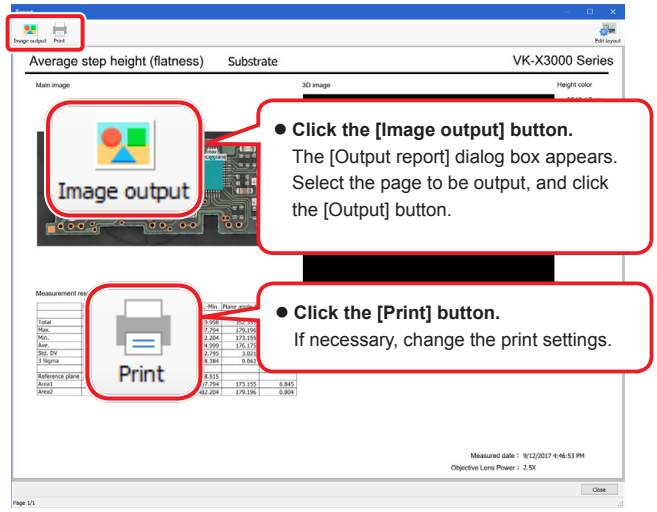


2. Select [Report] from the [Output data] button on the toolbar.

The report screen appears.

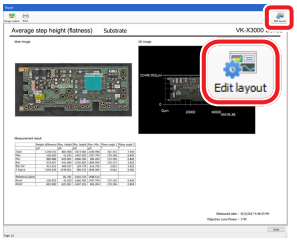


3. Save it as an image file by clicking the [Image output] button on the toolbar. Click the [Print] button to print.



4. Click the [Close] button to close the screen.

● **Edit the report layout**
Clicking the [Edit layout] button displays the [Edit report layout] screen.



The report layout can be edited.

- Click the [Insert text] button to insert the text box.
- Select an image and right click it, a menu related to layout editing will appear.
- Click the [Insert image] button to insert the image.
- Click the [Back to default] button to return to default.

Exporting to Excel file

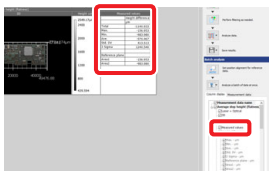
For the result measured by the Multifile Analyzer, the content of the grid view area is output to Excel file in unaltered form.

- The file is saved as an Excel workbook (*.xlsx). This extension is the standard file format for Excel 2007 and later.
- When you export to an Excel file, images, graphs, tables within cells and all other content of the grid sheet is output in unaltered form. Before performing the output, adjust the size of the grid sheet.

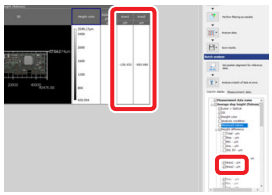
● About the grid sheet layout and the cell of the Excel output

The layout of the grid sheet is applied on the Excel sheet as it is.

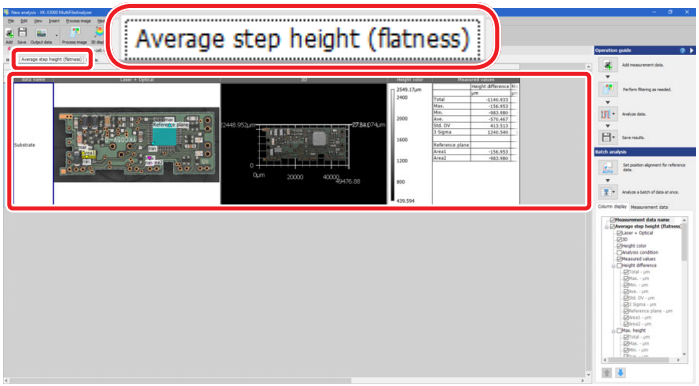
- The measurement results displayed in the [Measurement value list] checkbox of the [Column display] tab are output as images on the Excel sheet.



- The measurement results displayed individually in the [Column display] tab are output as numeric values to each cell on the Excel sheet.

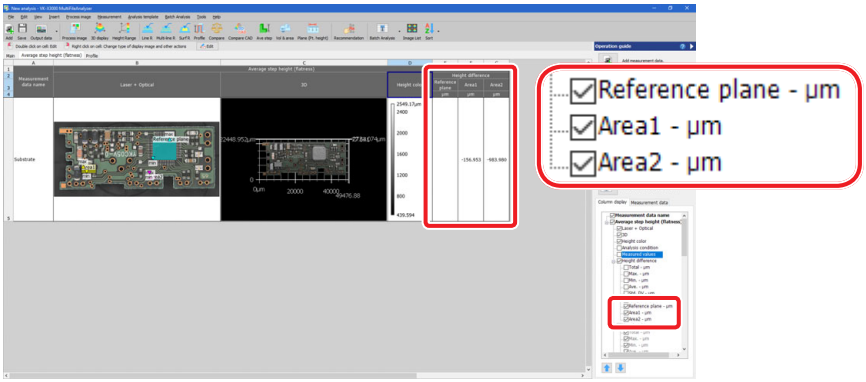


1. Select the grid sheet including the measurement result you wish to output in an Excel file.



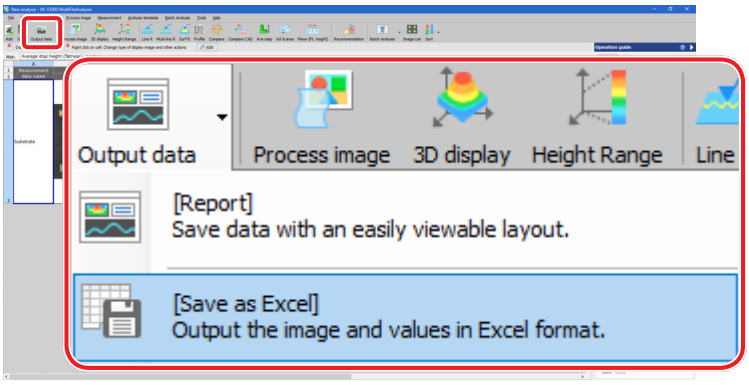
2. Select the measurement results you wish to output to cells in the Excel worksheet from the checkbox of the [Column display] tab.

Selecting the [Column display] tab adds the each result of the measurement items to each cell of the measurement results.

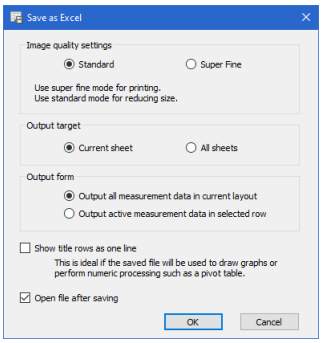


3. Select [Save Excel] from the [Output data] button on the toolbar.

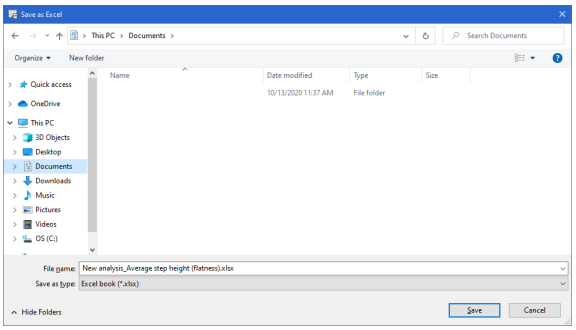
The [Save as Excel] dialog box appears.



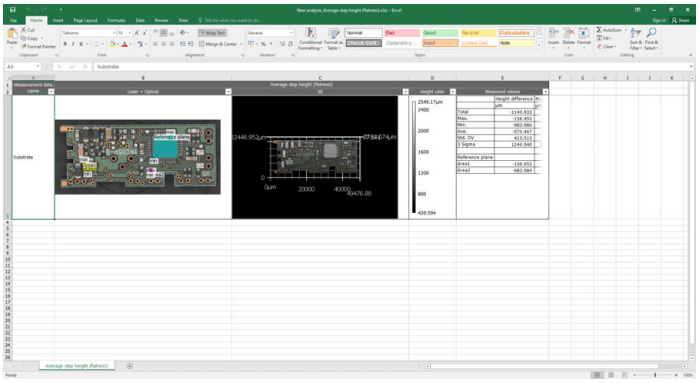
4. Change items as needed, and click [OK].



5. Select a destination folder in which to save the Excel file. Enter the file name, and click the [Save] button.



If Microsoft Office or Microsoft Excel is installed on your PC, the output file is displayed automatically.



Even if Microsoft Office or Microsoft Excel is not installed on your PC, the measurement results can be saved as an Excel format file.
In this case, use the output file with another PC.

- Microsoft Office, Microsoft Excel and Excel are registered trademarks of Microsoft Corporation.
- It is necessary to prepare Microsoft Office and Microsoft Excel separately when KEYENCE delivers the PC.

MEMO

MEMO

MEMO

Specifications are subject to change without notice.

KEYENCE CORPORATION

1-3-14, Higashi-Nakajima, Higashi-Yodogawa-ku, Osaka, 533-8555, Japan PHONE: +81-6-6379-2211

www.keyence.com/glb

AUSTRIA
Phone: +43 (0)2236 378266 0

BELGIUM
Phone: +32 (0)15 281 222

BRAZIL
Phone: +55-11-3045-4011

CANADA
Phone: +1-905-366-7655

CHINA
Phone: +86-21-3357-1001

CZECH REPUBLIC
Phone: +420 220 184 700

FRANCE
Phone: +33 1 56 37 78 00

GERMANY
Phone: +49-6102-3689-0

HONG KONG
Phone: +852-3104-1010

HUNGARY
Phone: +36 1 802 7360

INDIA
Phone: +91-44-4963-0900

INDONESIA
Phone: +62-21-2966-0120

ITALY
Phone: +39-02-6688220

KOREA
Phone: +82-31-789-4300

MALAYSIA
Phone: +60-3-7883-2211

MEXICO
Phone: +52-55-8850-0100

NETHERLANDS
Phone: +31 (0)40 206 6100

PHILIPPINES
Phone: +63-(0)2-8981-5000

POLAND
Phone: +48 71 368 61 60

ROMANIA
Phone: +40 (0)269 232 808

SINGAPORE
Phone: +65-6392-1011

SLOVAKIA
Phone: +421 (0)2 5939 6461

SLOVENIA
Phone: +386 (0)1 4701 666

SWITZERLAND
Phone: +41 (0)43 455 77 30

TAIWAN
Phone: +886-2-2721-8080

THAILAND
Phone: +66-2-369-2777

UK & IRELAND
Phone: +44 (0)1908-696-900

USA
Phone: +1-201-930-0100

VIETNAM
Phone: +84-24-3772-5555

A4WW1-MAN-2090

 16497GB 2021-1 96M16498 Printed in Japan

96M16498-1