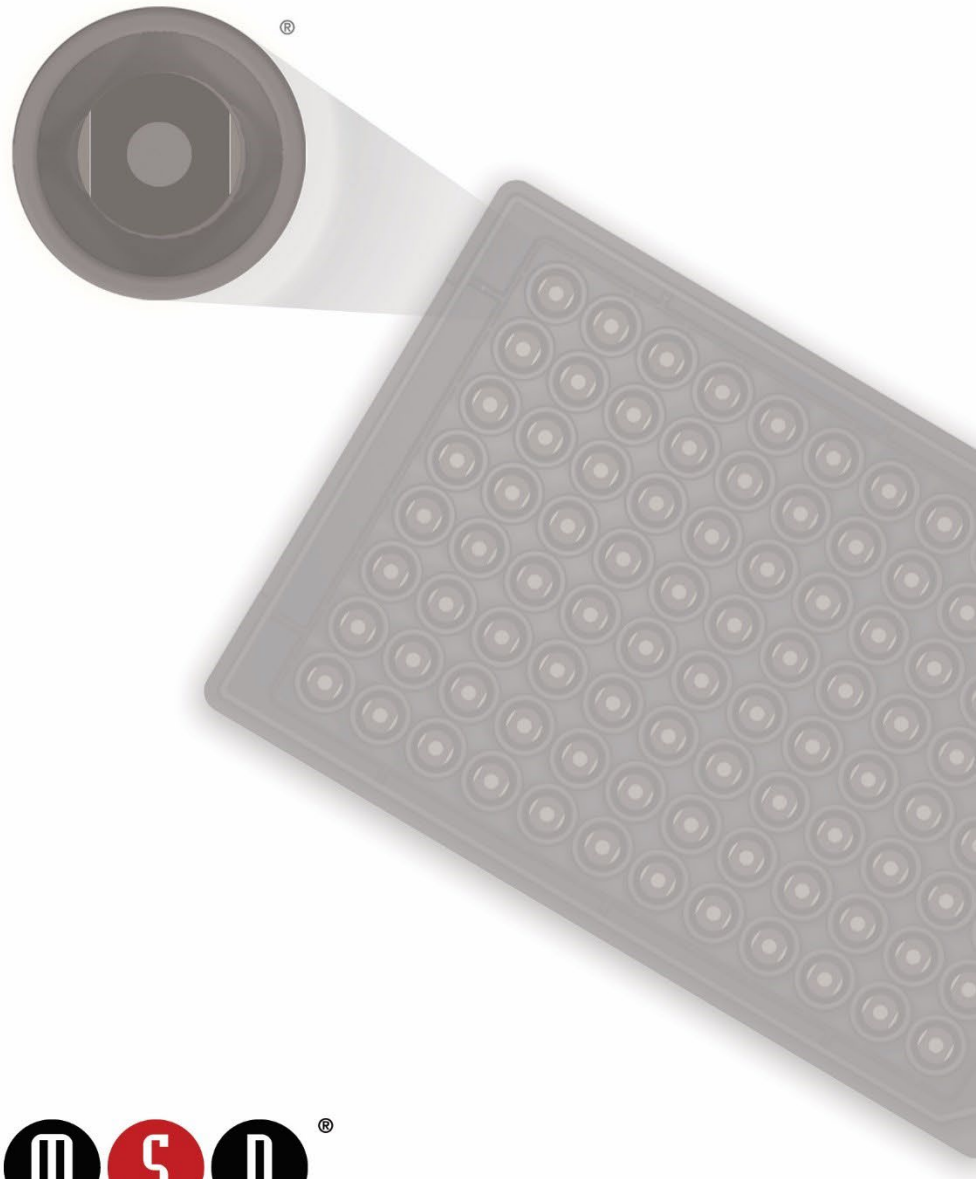
MSD® U-PLEX Platform

U-PLEX® Biomarker Group 2 (human, mouse, and NHP) Singleplex Assays

U-PLEX®



MSD®

www.mesoscale.com®

MSD U-PLEX Platform

U-PLEX Biomarker Group 2 (human, mouse, and NHP) Singleplex Assays

For use with serum, EDTA plasma, and cell culture supernatants.

This product insert should be read in its entirety before using this product.

FOR RESEARCH USE ONLY.

NOT FOR USE IN DIAGNOSTIC PROCEDURES.

Meso Scale Discovery
A division of Meso Scale Diagnostics, LLC.
1601 Research Blvd.
Rockville, MD 20850 USA
www.mesoscale.com

Table of Contents

Contact Information

MSD Customer Service

Phone: 1-240-314-2795
Fax: 1-301-990-2776
Email: CustomerService@mesoscale.com

MSD Scientific Support

Phone: 1-240-314-2798
Fax: 1-240-632-2219 Attn: Scientific Support
Email: ScientificSupport@mesoscale.com

Introduction

The MESO SCALE DISCOVERY® U-PLEX Biomarker Group 2 contains 3 analytes. A complete list of the entire U-PLEX menu can be found at *www.mesoscale.com/en/products_and_services/assay_kits/u-plex_gateway*.

A representative data set for each assay is presented in the product-specific datasheets. The datasheets are available at *www.mesoscale.com/support/product_information*.

Principle of the Assay

Singleplex assays are supplied on either 96-well (Figure 1) or 384-well plates. These plates provide high sensitivity and consistent performance. MSD GOLD™ branded plates also deliver excellent inter- and intra-lot uniformity.

Each singleplex assay is supplied with a biotinylated capture antibody that binds to streptavidin on the plate surface. Analytes in the sample bind to the capture antibody. Detection antibodies conjugated with electrochemiluminescent labels (MSD GOLD SULFO TAG™) bind to the analytes to complete the sandwich immunoassay. Once the immunoassay is complete, the plate is loaded into an MSD instrument where a voltage applied to the plate causes the captured labels to emit light. The instrument measures the intensity of emitted light (which is proportional to the amount of analyte present in the sample) and provides a quantitative measure of each analyte in the sample.

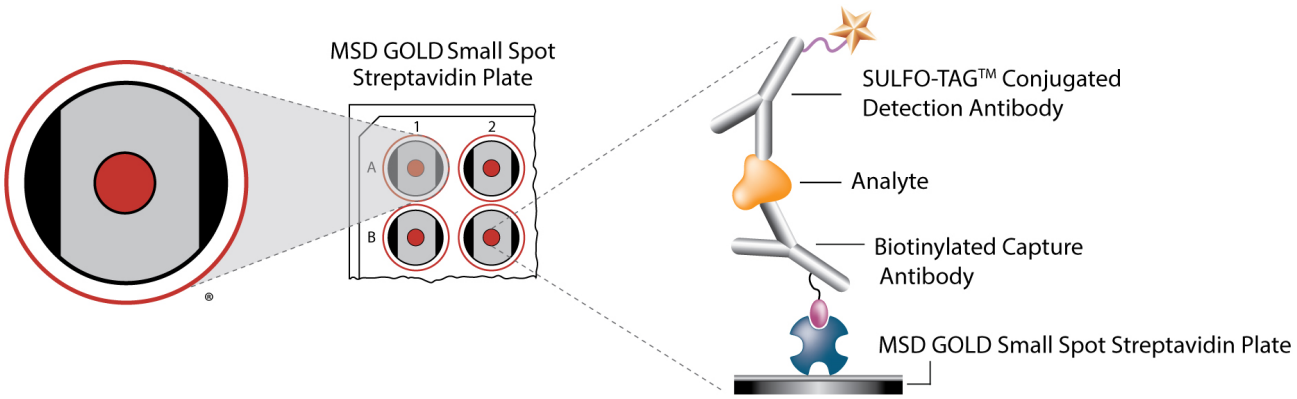


Figure 1. *A U-PLEX singleplex assay on a streptavidin plate.*

Components

Table 1 lists the components provided with U-PLEX Biomarker Group 2 Singleplex Assays. U-PLEX singleplex assays are available with either SECTOR™ or QuickPlex Ultra™ 96-well plates.

U-PLEX Singleplex Assays are also available with 384-well SECTOR plates. See Appendix B for details.

Table 1. Reagents that are supplied with all U-PLEX Biomarker Group 2 96-well Singleplex Assays

Reagent	Storage	Catalog No.	Size	Quantity Supplied			Description
				1 Plate	5 Plates	25 Plates	
MSD GOLD 96-Well Small Spot Streptavidin SECTOR Plate	2–8 °C	L45SA-1	1-spot	1 plate	5 plates	25 plates	96-well plate, foil sealed, with desiccant
96-Well Small Spot Streptavidin QuickPlex Ultra Plate		L4BLA-1					
Diluent 100	2–8 °C	R50AA-4	50 mL	1 bottle	1 bottle	5 bottles	Diluent for capture antibody
MSD GOLD Read Buffer B	RT	R60AM-1	18 mL	1 bottle	—	—	Buffer to catalyze the electrochemiluminescent reaction
		R60AM-2	90 mL	—	1 bottle	5 bottles	
Human and NHP Assays							
Diluent 57	≤-10 °C	R50BZ-1	10 mL	1 bottle	—	—	Diluent for samples and Calibrators
		R50BZ-2	50 mL	—	1 bottle	5 bottles	
Diluent 3	≤-10 °C	R50AP-1	8 mL	1 bottle	—	—	Diluent for detection antibody
		R50AP-2	40 mL	—	1 bottle	5 bottles	
Mouse Assays							
Diluent 41	≤-10 °C	R50AH-1	10 mL	1 bottle	—	—	Diluent for samples and Calibrators
		R50AH-2	50 mL	—	1 bottle	5 bottles	
Diluent 45	≤-10 °C	R50AI-3	8 mL	1 bottle	—	—	Diluent for detection antibody
		R50AI-4	40 mL	—	1 bottle	5 bottles	

RT = room temperature
Dash (—) = not applicable

Assay-Specific Reagents

U-PLEX Antibody Set

You will receive a U-PLEX Antibody Set containing a biotinylated capture antibody and a SULFO-TAG conjugated detection antibody (Table 2).

Table 2. Contents of U-PLEX Antibody Set

Name	Storage	Size	Quantity Supplied			Description
			1 Plate	5 Plates	25 Plates	
U-PLEX Analyte-Specific Antibody Set	2–8 °C	1-Plate	1	—	—	Set containing biotinylated capture antibody and SULFO-TAG conjugated detection antibody
		5-Plate	—	1	5	

Dash (—) = not applicable

U-PLEX Calibrators

The Biomarker Group 2 calibrator (Table 3) is a lyophilized multi-analyte blend.

Individual analyte concentrations are provided in the lot-specific certificates of analysis (COA). Assays include one vial of the appropriate calibrator for each assay plate.

Table 3. Calibrator 11 is used for all U-PLEX Biomarker Group 2 assays

Name	Storage	Catalog No.	Analytes
Calibrator 11	2–8 °C	C0244-2	TGF-β1, TGF-β2, TGF-β3

Instrument Compatibility

MSD offers U-PLEX assays designed for use on specific instrument platforms (Table 4).

Table 4. Instrument compatibility

Instrument	Assays on 96-well SECTOR plates	Assays on 96-well QuickPlex Ultra plates	Assays on 384-well SECTOR plates
MESO QuickPlex® Q 60MM	—	Y	—
MESO® QuickPlex SQ 120	Y	—	—
MESO QuickPlex SQ 120MM	Y	—	—
MESO SECTOR® S 600MM	Y	—	Y
MESO SECTOR S 600	Y	—	Y

Y = compatible
Dash (—) = not applicable

Additional Materials and Equipment

- ❑ Appropriately sized tubes for reagent preparation
- ❑ Polypropylene tubes for preparing dilutions
- ❑ Liquid-handling equipment suitable for dispensing 10 to 150 µL/well into a 96-well or 384-well microtiter plate
- ❑ Plate-washing equipment: automated plate washer or multichannel pipette
- ❑ Microtiter plate shaker (rotary) capable of shaking at 500–1,000 rpm (1,500 rpm for 384-well plates)
- ❑ MSD Wash Buffer (20X, 100 mL, catalog number R61AA-1) for plate washing. The standard protocol uses a minimum of 200 mL for a 96-well plate and 415 mL for a 384-well plate. Automated plate washers may need overage added to these volumes.
- ❑ Adhesive plate seals
- ❑ Deionized water
- ❑ Vortex mixer
- ❑ 1M HCl
- ❑ 1.2M NaOH in 0.5M HEPES
- ❑ pH paper to confirm neutralization of samples (optional)

Safety

Use safe laboratory practices: wear gloves, safety glasses, and lab coats when handling assay components. Handle and dispose of all hazardous samples properly in accordance with local, state, and federal guidelines.

Additional product-specific safety information is available in the applicable safety data sheet (SDS), which can be obtained from MSD Customer Service or at the www.mesoscale.com® website.

Assay Protocol (96-well plates)

Please read the entire detailed Reagent Preparation instructions and the Best Practices (Appendix A) before starting work.

STEP 1: Coat Plates

- ❑ Wash the plate 3 times with at least 150 µL/well of 1X Wash Buffer.
- ❑ Add 200 µL of biotinylated capture antibody to 3.3 mL of Diluent 100. Mix by vortexing.
- ❑ Add 25 µL of the biotinylated antibody solution to each well of the provided MSD plate. Tap the plate gently on all sides. Seal the plate with an adhesive plate seal and shake for 1 hour at room temperature or overnight at 2–8 °C.
- ❑ Wash the plate 3 times with at least 150 µL/well of 1X MSD Wash Buffer. The plate is now coated and ready for use.

STEP 2: Add Samples and Calibrators

- ❑ Add 50 µL of prepared Calibrator Standard or sample to each well. Seal the plate with an adhesive plate seal. Incubate at room temperature with shaking for 2 hours.

STEP 3: Wash and Add Detection Antibody Solution

- ❑ Wash the plate 3 times with at least 150 µL/well of 1X Wash Buffer.
- ❑ Add 50 µL of detection antibody solution to each well. Seal the plate with an adhesive plate seal and incubate at room temperature with shaking for 1 hour.

STEP 4: Wash and Read

- ❑ Wash the plate 3 times with at least 150 µL/well of 1X Wash Buffer.
- ❑ Add 150 µL of MSD GOLD Read Buffer B to each well. Analyze the plate on an MSD instrument. Incubation in Read Buffer is not required before reading the plate.

Reagent Preparation

Important: Aliquot diluents upon the first thaw in suitable volumes for refreezing.

Prepare Samples

TGF-β samples typically require an acid treatment for activation. Prepare TGF-β samples as follows:

- ❑ Add 20 µL of 1M HCl per 100 µL of neat sample volume. Vortex briefly.
- ❑ Incubate the sample for 10 minutes at room temperature.
- ❑ Neutralize the sample by adding 14 µL of 1.2 M NaOH in 0.5M HEPES per 100 µL of sample volume. Vortex briefly. Samples are ready to use. Use immediately.

Note: The pipetted volumes noted above can be reduced by half to 10 µL, 50 µL, and 7 µL. if pipettes are available to accurately transfer these volumes.

Dilute samples at least two-fold using Assay Diluent. The dilution factor may need to be optimized for the given sample type. Consult MSD technical support if assistance or additional information is required.

Note: If samples require additional dilution, please dilute only after the acid neutralization step.

Prepare Calibration Standards

Reconstitution

Bring Calibrators to room temperature. Reconstitute lyophilized Calibrators by adding 250 µL of Assay Diluent to the glass vial. This will result in a 10X concentrated stock of the Calibrator. Invert the reconstituted Calibrator at least 3 times. Do not vortex at this point. Let the reconstituted solution equilibrate at room temperature for 15–30 minutes and then vortex briefly. The Calibrator is now ready for use.

Dilutions

The following instructions are for the preparation of 7 Calibrator Standard solutions plus a Zero Calibrator Standard for use in an 8-point standard curve (Figure 2; Table 5).

Important: Change pipette tips and vortex calibrators after each dilution step. Calibrators are typically run in duplicate. There is a sufficient volume of each dilution to run up to 6 replicates using this process.

- ❑ Prepare Calibrator Standard 1 by adding 25 µL of the reconstituted Calibrator to 225 µL of Assay Diluent. Mix by vortexing.
- ❑ For Calibrator Standard 2, add 75 µL of Calibrator Standard 1 to 225 µL of Assay Diluent.
- ❑ Repeat 4-fold serial dilutions to generate a total of 7 Calibrator Standards. Mix by vortexing between each serial dilution.
- ❑ Use Assay Diluent as Calibrator Standard 8 (zero Calibrator).

Note: For the lot-specific concentration of Calibrators in the blend, refer to the COA supplied with the assay. You can also find a copy of the COA at www.mesoscale.com.

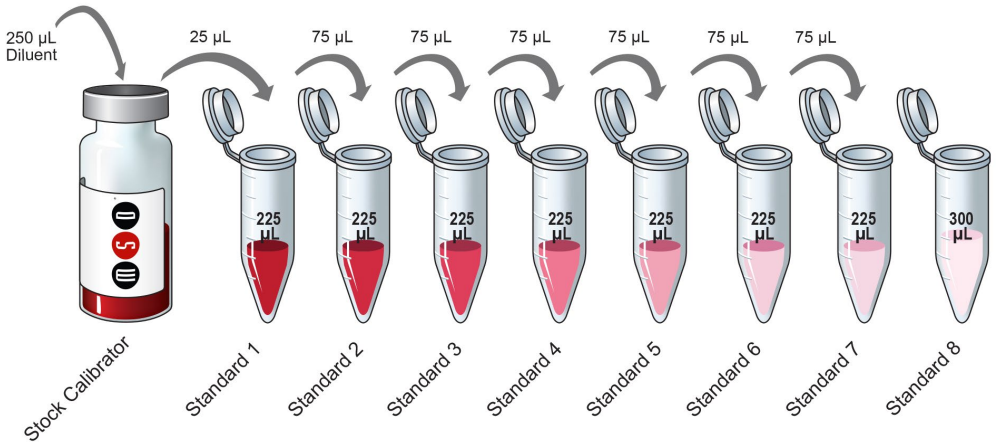


Figure 2. Dilution schema for U-PLEX calibrator standards for singleplex assays.

Table 5. Serial dilution to generate the standard curve

Calibrator Standard No.	Tube No.	Source of Calibrator	Volume of Reconstituted Calibrator (µL)	Assay Diluent (µL)	Total Volume (µL)
1	1	Stock Calibrator vial	25	225	250
2	2	From tube 1	75	225	300
3	3	From tube 2	75	225	300
4	4	From tube 3	75	225	300
5	5	From tube 4	75	225	300
6	6	From tube 5	75	225	300
7	7	From tube 6	75	225	300
8 (zero Calibrator)	8	—	0	300	300

Dash (—) = not applicable

Prepare Detection Antibody Solution

The detection antibody is provided as a 100X stock solution. The working solution is 1X for 96-well assays. Prepare the detection antibody solution immediately before use.

For one plate, combine:

- ❑ 60 µL of the supplied 100X detection antibody
- ❑ 5,940 µL of Diluent 3

Wash Buffer

Prepare a 1X working solution of MSD Wash Buffer (20X, 100 mL, catalog number R61AA-1) by diluting the 20X stock with deionized water. 1X MSD Wash Buffer can be stored at room temperature for up to two weeks. MSD Wash Buffer (20X, 100 mL, catalog number R61AA-1) is ordered separately.

Read Buffer

MSD provides MSD GOLD Read Buffer B ready for use. Do not dilute.

Appendix A

Alternative Assay Protocols

The suggestions below may be useful for simplifying the protocol.

- ❑ **Alternate Protocol 1, Co-incubation:** Co-incubating samples and detection antibody solution may improve the sensitivity for some assays. Note that the use of the co-incubation protocol may result in sample concentrations that vary from concentrations obtained with the standard protocol. If this protocol is chosen, we recommend that this protocol be used for the entirety of the research project.
- ❑ **Alternate Protocol 2, Reduced Wash:** For cell culture supernatants, you may simplify the protocol by eliminating one of the washes in each step.

Best Practices

- Ensure that all assay components are equilibrated to room temperature before use. Mix well. Bring plates to room temperature before opening the packet.
- Avoid bubbles at each stage of reagent addition because they can lead to variable results. This is very important when adding Read Buffer at the final step prior to plate reading the plate.
- Plate shaking should be vigorous, with a rotary motion between 500 and 1,000 rpm (1,000 to 1,500 rpm for 384-well plates) depending on the shaker design and orbit. Keep the shaking speed and model the same for long-term studies.
- Tap the plate on a paper towel after washing to ensure the removal of residual fluid.
- Avoid excessive drying of the plate during washing steps, especially if working inside a laminar flow hood or another high-airflow environment. Cover the plate with a new plate seal immediately after washing to protect it from airflow, and add solutions to the plate as soon as possible.
- Use a new adhesive plate seal for all incubation steps. Avoid re-using plate seals.
- Dispense reagents and wash fluids at the side of the well towards the bottom corner.
- Remove the plate seal before reading the plate in the instrument.
- Keep time intervals consistent between the addition of Read Buffer and reading the plate to improve inter-plate precision. Prepare an MSD instrument before adding Read Buffer.
- Do not shake the plate after adding Read Buffer.
- Do not obscure or damage the plate barcode; it is required for the plate reader.
- Only use the reagents provided with this kit.
- Use reconstituted or thawed calibrators immediately. If storage is necessary, divide into suitably sized aliquots, and store immediately at ≤–70 °C.

Working with Partial Plates

A portion of a plate may be used when developing assays. Volumes should be adjusted proportionally when preparing reagents for partial plates.

When running a partial plate, seal the unused sectors to avoid contaminating unused wells. Remove all seals before reading. Partially used plates may be sealed and stored for up to 30 days at 2–8 °C in the original foil pouch with desiccant.

Appendix B

Components for 384-well Assays

Table 6. Reagents that are supplied with all U-PLEX Biomarker Group 2 384-well Singleplex Assays

Reagent	Storage	Catalog No.	Size	Quantity Supplied		Description
				5 Plates	25 Plates	
MSD 384-well Streptavidin SECTOR Plate	2–8 °C	L21SA-1	–	5 plates	25 plates	384-well plate, foil sealed, with desiccant
Diluent 100	2–8 °C	R50AA-4	50 mL	2 bottles	10 bottles	Diluent for capture antibody
MSD GOLD Read Buffer B	RT	R60AM-2	90 mL	1 bottle	5 bottles	Buffer to catalyze the electrochemiluminescent reaction
Human or NHP Assays						
Diluent 57	≤–10 °C	R50BZ-2	50 mL	2 bottles	10 bottles	Diluent for samples and Calibrators
Diluent 3	≤–10 °C	R50AP-2	40 mL	2 bottles	10 bottles	Diluent for detection antibody
Mouse Assays						
Diluent 41	≤–10 °C	R50AH-2	50 mL	2 bottles	10 bottles	Diluent for samples and Calibrators
Diluent 45	≤–10 °C	R50AI-4	40 mL	2 bottles	10 bottles	Diluent for detection antibody

Dash (—) = not applicable
RT = room temperature

Reagent Preparation for 384-well Plates

Important: Upon the first thaw, aliquot diluents into suitably sized aliquots before refreezing.

Coat 384-well Plate

- ❑ Add 240 µL of biotinylated capture antibody to 11.76 mL of Diluent 100. Mix by vortexing.
- ❑ Add 25 µL of the above solution to each well of the provided plate. Tap the plate gently on all sides. Seal the plate with an adhesive plate seal and incubate with shaking at room temperature for 2 hours.
- ❑ Wash the plate 3 times with 80 µL/well of 1X MSD Wash Buffer. The plate is now coated and ready for use. Plates may be sealed and stored overnight at 4 °C.

Prepare Detection Antibody Solution

The detection antibody is provided as a 100X stock solution. The working solution is 0.5X for 384-well assays. Prepare the detection antibody solution immediately before use.

- ❑ For one plate, combine:
  - 60 µL of the supplied 100X detection antibody
  - 11.94 mL of Diluent 3 (human and NHP) or Diluent 45 (mouse)

Assay Protocol (384-well plates)

Important: Please read the entire detailed Reagent Preparation instructions and the Best Practices (Appendix A) before starting work.

STEP 1: Add Samples and Calibrators

- ❑ Wash the plate 3 times with 80 µL/well of 1X MSD Wash Buffer.
- ❑ Add 25 µL of the prepared Calibrator Standard or sample to each well. Seal the plate with an adhesive plate seal. Incubate at room temperature with shaking for 2 hours.

STEP 2: Wash and Add Detection Antibody Solution

- ❑ Wash the plate 3 times with 80 µL/well of 1X MSD Wash Buffer.
- ❑ Add 25 µL of detection antibody solution to each well. Seal the plate with an adhesive plate seal. Incubate at room temperature with shaking for 2 hours.

STEP 3: Wash and Read

- ❑ Wash the plate 3 times with 80 µL/well of 1X MSD Wash Buffer.
- ❑ Add 40 µL of MSD GOLD Read Buffer B to each well. Analyze the plate on an MSD instrument. Incubation in Read Buffer is not required before reading the plate.

Alternative Assay Protocols

The suggestions below may be useful for simplifying the protocol.

- ❑ **Alternate Protocol, Shortened Incubation:** Some 384-well assays may achieve acceptable performance with shorter incubations. Consider reducing the incubation time of samples in the plate and the incubation time of detection antibody.

Plate Diagrams

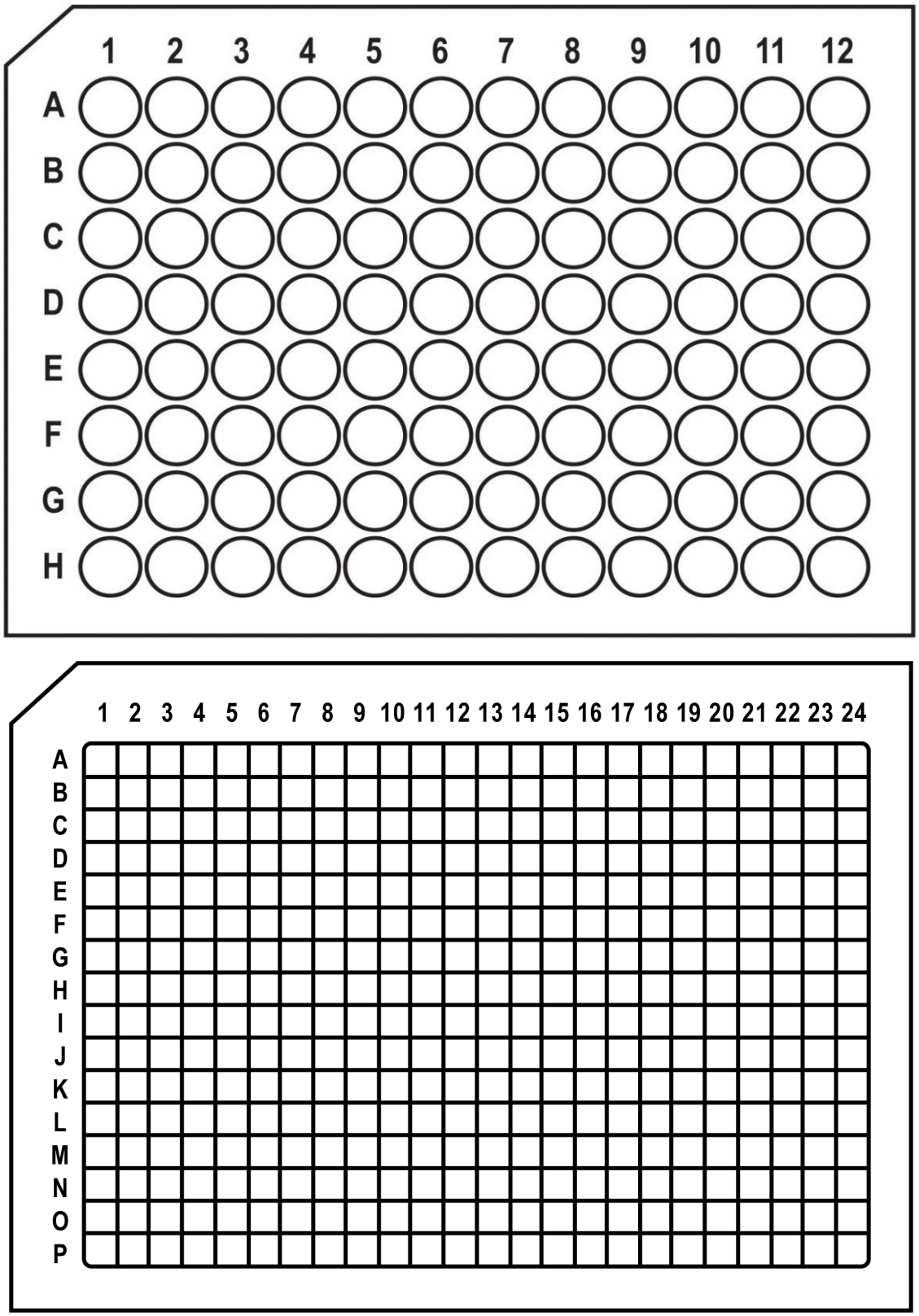


Figure 3. *Plate diagrams. Similar plate layouts can be created in Excel and easily imported into DISCOVERY WORKBENCH® software.*