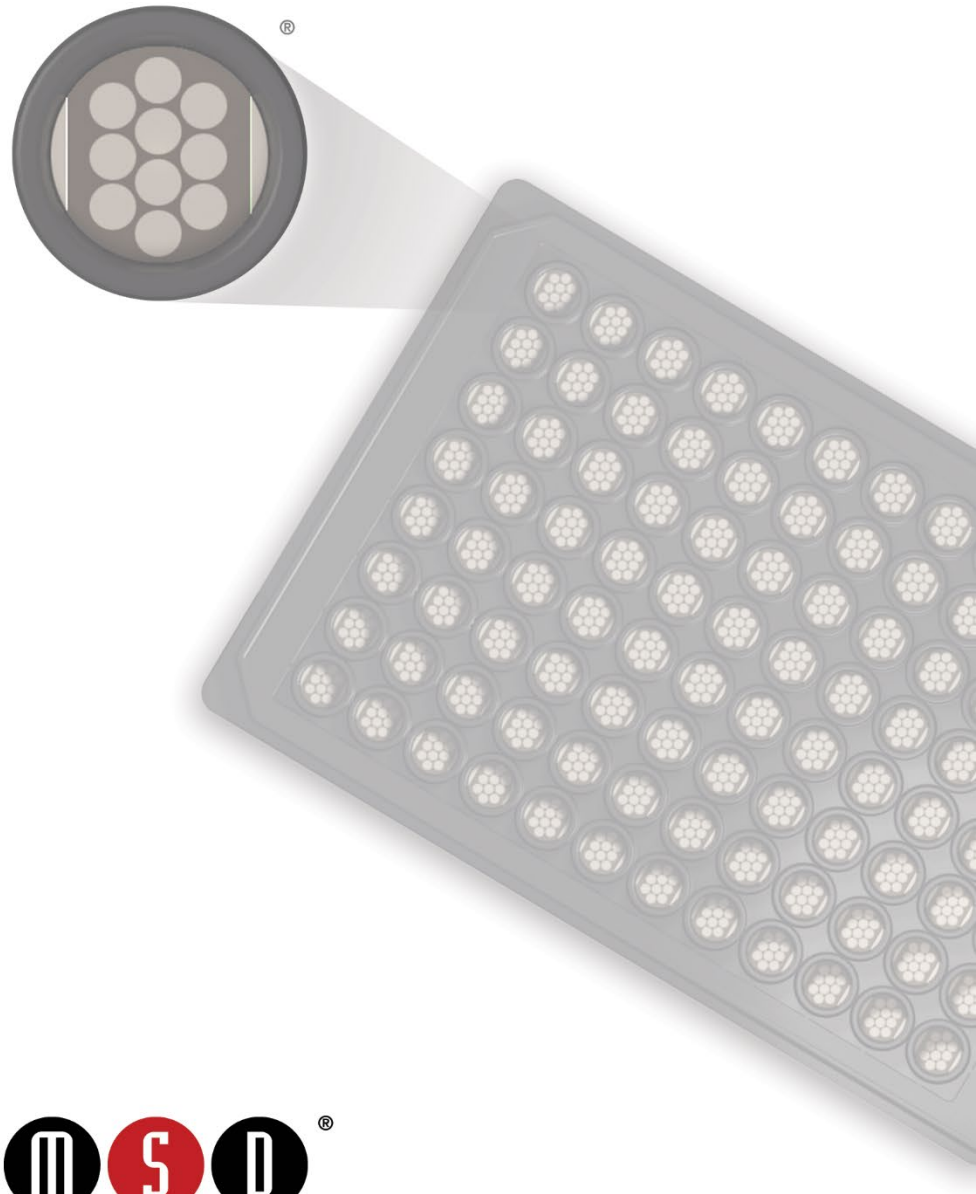
MSD® MULTI-SPOT Assay System

COVID-19 Serology Mouse Kits

V-PLEX®



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V-PLEX® COVID-19 Serology Mouse Kits

The V-PLEX COVID-19 Serology Mouse Kits include multiple mouse panels to qualitatively measure the presence and relative amounts of mouse antibodies (IgG, IgM, and IgA) to antigens related to SARS-1, SARS-CoV-2, including the Alpha, Beta, Gamma, Delta, Lambda, Mu, Omicron, and several emerging variants of the SARS-CoV-2 virus.

This package insert must 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

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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 V-PLEX COVID-19 Serology Mouse Kits qualitatively measure mouse antibodies to antigens related to SARS-1 and SARS-CoV-2, including variants of the SARS-CoV-2 virus. The kits are available as panels and detect isotypes (IgG, IgM, and IgA) of antigen-specific antibodies.

Principle of the Assay

Plates are provided with antigens on spots in the wells of a 96-well plate (Table 1). Antibodies in the mouse sample bind to the antigens on the spots, and goat anti-mouse antibodies (IgG, IgM, or IgA) conjugated with MSD SULFO-TAG™ are used for detection (Figure 1). The plate is read on an MSD® instrument, which measures the light emitted from the MSD SULFO-TAG.

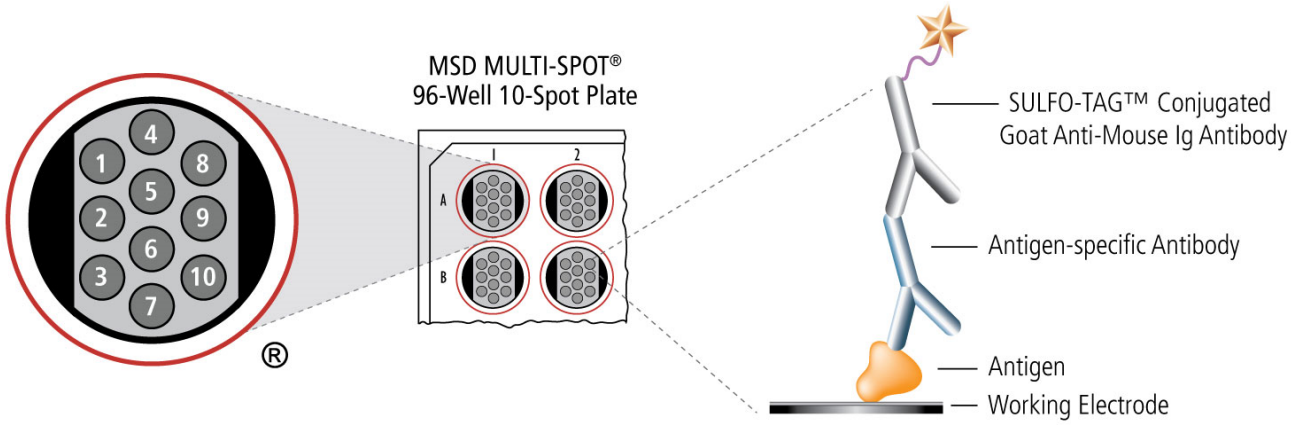

Figure 1. Schematic for the V-PLEX COVID-19 Serology Mouse Kits.

Kit Components

The V-PLEX COVID-19 Serology Mouse Kits are available as panels defined by a set of antigens coated on a 10-spot MULTI-SPOT® 96-well plate. A kit includes plate(s), one of the available detection antibodies (goat anti-mouse IgG, IgM, or IgA), and all other reagents necessary to conduct the assay. No calibrator or control samples are provided with the mouse kits.

Table 1 describes the available plates and the location of antigens on each plate. Table 2 shows the relationship between the V-PLEX COVID-19 Serology Mouse Kits and the plates included in those kits. Together, Table 1 and Table 2 help users select the kits that contain their preferred antigens. Table 3 provides a list of components included in each kit. Table 4 provides information about the SARS-CoV-2 variant antigens, including their amino acid modifications, lineages, and common designations.

Table 1. List of antigens and their spot assignments on the MULTI-SPOT 96-Well, 10-Spot plates

Plate Description	SARS-CoV-2 Plate 1	SARS-CoV-2 Plate 2	SARS-CoV-2 Plate 5	SARS-CoV-2 Plate 6	SARS-CoV-2 Plate 7
Spot 1	SARS-CoV-2 Spike	SARS-CoV-2 Spike	SARS-CoV-2 Spike	SARS-CoV-2 Spike	SARS-CoV-2 Spike
Spot 2	*BSA*	*BSA*	*BSA*	SARS-CoV-2 Spike (D614G)	SARS-CoV-2 S1 RBD (B.1.351; B.1.351.1)
Spot 3	SARS-CoV-2 Nucleocapsid	SARS-CoV-2 Nucleocapsid	SARS-CoV-2 Nucleocapsid	SARS-CoV-2 Nucleocapsid	SARS-CoV-2 Nucleocapsid
Spot 4	SARS-CoV-1 Spike	*BSA*	*BSA*	*BSA*	SARS-CoV-2 S1 RBD (P.1)
Spot 5	*BSA*	*BSA*	*BSA*	*BSA*	*BSA*
Spot 6	*BSA*	*BSA*	*BSA*	*BSA*	SARS-CoV-2 S1 RBD (B.1.1.7)
Spot 7	*BSA*	*BSA*	SARS-CoV-2 Spike (P.1)	SARS-CoV-2 Spike (P.1)	SARS-CoV-2 Spike (P.1)
Spot 8	SARS-CoV-2 S1 NTD	*BSA*	SARS-CoV-2 Spike (B.1.1.7)	SARS-CoV-2 Spike (B.1.1.7)	SARS-CoV-2 Spike (B.1.1.7)
Spot 9	*BSA*	*BSA*	SARS-CoV-2 Spike (B.1.351)	SARS-CoV-2 Spike (B.1.351)	SARS-CoV-2 Spike (B.1.351)
Spot 10	SARS-CoV-2 S1 RBD	SARS-CoV-2 S1 RBD	*BSA*	SARS-CoV-2 S1 RBD	SARS-CoV-2 S1 RBD

Plate Description	SARS-CoV-2 Plate 8	SARS-CoV-2 Plate 9	SARS-CoV-2 Plate 11	SARS-CoV-2 Plate 12
Spot 1	SARS-CoV-2 Spike	RBD (B.1.427; B.1.429; B.1.526.1)	RBD (B.1.427; B.1.429; B.1.526.1)	RBD (A.23.1)
Spot 2	SARS-CoV-2 S1 RBD (B.1.427; B.1.429; B.1.526.1)	RBD (B.1.351; B.1.351.1)	RBD (B.1.351; B.1.351.1)	RBD (C.37)
Spot 3	SARS-CoV-2 Nucleocapsid	RBD (B.1.525; B.1.526; B.1.618; P.2; R.1)	RBD (B.1.525; B.1.526; B.1.618; P.2; R.1)	RBD (B.1.525; B.1.526; B.1.618; P.2; R.1)
Spot 4	SARS-CoV-2 S1 RBD (B.1.525; B.1.526; B.1.618; P.2; R.1)	RBD (P.1)	RBD (P.1)	RBD (BV-1)
Spot 5	BSA	RBD (B.1.526.2)	RBD (B.1.526.2)	RBD (B.1.1.519)
Spot 6	SARS-CoV-2 S1 RBD (B.1.526.2)	RBD (B.1.1.7)	RBD (B.1.1.7)	RBD (A.VOI.V2)
Spot 7	BSA	RBD (B.1.1.7+E484K; P.3)	RBD (B.1.1.7+E484K; P.3)	RBD (B.1.1.7+E484K; P.3)
Spot 8	SARS-CoV-2 Spike (B.1.526)	RBD (B.1.617; B.1.617.1; B.1.617.3)	RBD (B.1.617; B.1.617.1; B.1.617.3)	RBD (B.1.617; B.1.617.1; B.1.617.3)
Spot 9	SARS-CoV-2 Spike (B.1.429)	RBD (B.1.214.2)	RBD (AY.3; AY.4; AY.4.2; AY.5; AY.6; AY.7; AY.12; AY.14; B.1.617.2; B.1.617.2+ΔY144)	RBD (AY.3; AY.4; AY.4.2; AY.5; AY.6; AY.7; AY.12; AY.14; B.1.617.2; B.1.617.2+ΔY144)
Spot 10	SARS-CoV-2 S1 RBD	SARS-CoV-2 S1 RBD	SARS-CoV-2 S1 RBD	SARS-CoV-2 S1 RBD

Table 1 *(continued)*

Plate Description	SARS-CoV-2 Plate 13	SARS-CoV-2 Plate 14	SARS-CoV-2 Plate 15
Spot 1	SARS-CoV-2 Spike	SARS-CoV-2 Spike	SARS-CoV-2 Spike
Spot 2	Spike (P.2)	Spike (A.23.1)	Spike (AY.1)
Spot 3	Spike (B.1.617.1)	Spike (A.VOI.V2)	Spike (AY.2)
Spot 4	Spike (B.1.617.2)	Spike (B.1.617.2; AY.3; AY.5; AY.6; AY.7; AY.14) **Alt Seq 1**	Spike (B.1.617.2+ΔY144)
Spot 5	Spike (B.1.617.3)	Spike (C.37)	Spike (B.1.620)
Spot 6	Spike (B.1.617)	Spike (R.1)	Spike (B.1.258.17)
Spot 7	Spike (P.1)	Spike (P.3)	Spike (B.1.466.2)
Spot 8	Spike (B.1.1.7)	Spike (B.1.525)	Spike (B.1.1.7+E484K)
Spot 9	Spike (B.1.351)	Spike (B.1.1.519)	Spike (B.1.351.1)
Spot 10	Spike (B.1.526.1)	Spike (BV-1)	Spike (B.1.618)

Note: Alternative S-GENE mutations for Spike of B.1.617.2 are listed as "**Alt Seq #**."

Plate Description	SARS-CoV-2 Plate 16	SARS-CoV-2 Plate 17	SARS-CoV-2 Plate 18	SARS-CoV-2 Plate 19
Spot 1	RBD (AY.1; AY.2)	SARS-CoV-2 Spike	SARS-CoV-2 Spike	SARS-CoV-2 Spike
Spot 2	RBD (B.1.351; B.1.351.1)	SARS-CoV-2 Spike (D614G)	Spike (P.2)	Spike (B.1.621)
Spot 3	RBD (B.1.525; B.1.526; B.1.618; P.2; R.1)	SARS-CoV-2 Nucleocapsid	Spike (B.1.617.1)	Spike (AY.2) **Alt Seq 1**
Spot 4	RBD (B.1.620)	SARS-CoV-2 Spike (B.1.617.2; AY.3; AY.5; AY.6; AY.7; AY.14) **Alt Seq 1**	Spike (B.1.617.2; AY.4) **Alt Seq 2**	Spike (B.1.617.2; AY.4) **Alt Seq 2**
Spot 5	*BSA*	*BSA*	Spike (B.1.617.3)	Spike (C.37)
Spot 6	*BSA*	*BSA*	Spike (B.1.617)	Spike (AY.12)
Spot 7	RBD (B.1.1.7+E484K; P.3)	SARS-CoV-2 Spike (P.1)	Spike (P.1)	Spike (P.1)
Spot 8	RBD (B.1.258.17; B.1.466.2)	SARS-CoV-2 Spike (B.1.1.7)	Spike (B.1.1.7)	Spike (AY.1) **Alt Seq 1**
Spot 9	RBD (AY.3; AY.4; AY.4.2; AY.5; AY.6; AY.7; AY.12; AY.14; B.1.617.2; B.1.617.2+ΔY144)	SARS-CoV-2 Spike (B.1.351)	Spike (B.1.351)	Spike (B.1.351)
Spot 10	SARS-CoV-2 S1 RBD	SARS-CoV-2 S1 RBD	Spike (B.1.526.1)	Spike (B.1.617.2; AY.3; AY.5; AY.6; AY.7; AY.14) **Alt Seq 1**

Note: Alternative S-GENE mutations for Spike of AY.1, AY.2, and B.1.617.2 are listed as "**Alt Seq #**."

Table 1 *(continued)*

Plate Description	SARS-CoV-2 Plate 20	SARS-CoV-2 Plate 22	SARS-CoV-2 Plate 23	SARS-CoV-2 Plate 24
Spot 1	SARS-CoV-2 Spike	RBD (B.1.1.529; BA.1; BA.1.15)	SARS-CoV-2 Spike	SARS-CoV-2 Spike
Spot 2	Spike (B.1.617.2 +4)	RBD (B.1.351; B.1.351.1)	Spike (B.1.1.529; BA.1; BA.1.15)	Spike (B.1.1.529; BA.1; BA.1.15)
Spot 3	Spike (B.1.617.2 +3)	*BSA*	Spike (AY.4.2)	SARS-CoV-2 Nucleocapsid
Spot 4	Spike (B.1.617.2; AY.4) **Alt Seq 2**	RBD (P.1)	Spike (B.1.617.2; AY.4) **Alt Seq 2**	Spike (B.1.617.2; AY.4) **Alt Seq 2**
Spot 5	Spike (B.1.617.2 +2)	*BSA*	*BSA*	*BSA*
Spot 6	Spike (B.1.617.2 +1)	RBD (B.1.1.7)	*BSA*	*BSA*
Spot 7	Spike (P.1)	*BSA*	Spike (P.1)	Spike (P.1)
Spot 8	Spike (B.1.1.7)	*BSA*	Spike (B.1.1.7)	Spike (B.1.1.7)
Spot 9	Spike (B.1.351)	RBD (AY.3; AY.4; AY.4.2; AY.5; AY.6; AY.7; AY.12; AY.14; B.1.617.2; B.1.617.2+ΔY144)	Spike (B.1.351)	Spike (B.1.351)
Spot 10	Spike (B.1.617.2; AY.3; AY.5; AY.6; AY.7; AY.14) **Alt Seq 1**	SARS-CoV-2 S1 RBD	Spike (B.1.617.2; AY.3; AY.5; AY.6; AY.7; AY.14) **Alt Seq 1**	SARS-CoV-2 S1 RBD

Note: Alternative S-GENE mutations for Spike of B.1.617.2 are listed as "**Alt Seq #**."

Plate Description	SARS-CoV-2 Plate 25	SARS-CoV-2 Plate 26	SARS-CoV-2 Plate 27	SARS-CoV-2 Plate 28
Spot 1	SARS-CoV-2 Spike	RBD (B.1.1.529; BA.1; BA.1.15)	SARS-CoV-2 Spike	RBD (BA.2.12.1)
Spot 2	Spike (B.1.1.529; BA.1; BA.1.15)	RBD (B.1.351; B.1.351.1)	Spike (BA.2.12.1)	RBD (B.1.351; B.1.351.1)
Spot 3	Spike (BA.2; BA.2.1; BA.2.2; BA.2.3; BA.2.5; BA.2.6; BA.2.7; BA.2.8; BA.2.10; BA.2.12)	RBD (BA.2; BA.2.1; BA.2.2; BA.2.3; BA.2.5; BA.2.6; BA.2.7; BA.2.8; BA.2.10; BA.2.10.1; BA.2.12)	Spike (BA.2; BA.2.1; BA.2.2; BA.2.3; BA.2.5; BA.2.6; BA.2.7; BA.2.8; BA.2.10; BA.2.12)	RBD (BA.2; BA.2.1; BA.2.2; BA.2.3; BA.2.5; BA.2.6; BA.2.7; BA.2.8; BA.2.10; BA.2.10.1; BA.2.12)
Spot 4	Spike (B.1.617.2; AY.4) **Alt Seq 2**	RBD (P.1)	Spike (B.1.617.2; AY.4) **Alt Seq 2**	RBD (BA.2+L452M)
Spot 5	Spike (BA.3)	*BSA*	Spike (BA.3)	RBD (BA.2+L452R)
Spot 6	Spike (BA.1+R346K; BA.1.1; BA.1.1.15)	RBD (B.1.1.7)	Spike (BA.2+L452M)	RBD (B.1.1.7)
Spot 7	Spike (BA.1+L452R)	*BSA*	Spike (BA.2+L452R)	RBD (BA.4; BA.5)
Spot 8	Spike (B.1.1.7)	RBD (BA.1.1; BA.1.1.15)	Spike (BA.4)	RBD (BA.3)
Spot 9	Spike (B.1.351)	RBD (AY.3; AY.4; AY.4.2; AY.5; AY.6; AY.7; AY.12; AY.14; B.1.617.2; B.1.617.2+ΔY144)	Spike (B.1.351)	RBD (AY.3; AY.4; AY.4.2; AY.5; AY.6; AY.7; AY.12; AY.14; B.1.617.2; B.1.617.2+Δ144)
Spot 10	Spike (B.1.640.2)	SARS-CoV-2 S1 RBD	Spike (BA.5)	SARS-CoV-2 S1 RBD

Note: Alternative S-GENE mutations for Spike of B.1.617.2 are listed as "**Alt Seq #**."

Table 1 *(continued)*

Plate Description	SARS-CoV-2 Plate 29	SARS-CoV-2 Plate 30	SARS-CoV-2 Plate 31	SARS-CoV-2 Plate 32	SARS-CoV-2 Plate 33
Spot 1	SARS-CoV-2 Spike	RBD (BA.2.12.1)	SARS-CoV-2 Spike	SARS-CoV-2 Spike	RBD (B.1.1.529; BA.1; BA.1.15)
Spot 2	Spike (BA.2.12.1)	RBD (B.1.351; B.1.351.1)	*BSA*	Spike (B.1.1.529; BA.1; BA.1.15)	RBD (BQ.1.1)
Spot 3	Spike (BA.2; BA.2.1; BA.2.2; BA.2.3; BA.2.5; BA.2.6; BA.2.7; BA.2.8; BA.2.10; BA.2.12)	RBD (BA.2; BA.2.1; BA.2.2; BA.2.3; BA.2.5; BA.2.6; BA.2.7; BA.2.8; BA.2.10; BA.2.10.1; BA.2.12)	SARS-CoV-2 Nucleocapsid	Spike (XBB.1)	RBD (BA.2.75.2)
Spot 4	Spike (B.1.617.2; AY.4) **Alt Seq 2**	*BSA*	*BSA*	Spike (BF.7)	RBD (BA.4.6; BF.7)
Spot 5	*BSA*	*BSA*	*BSA*	Spike (BA.2.75.2)	*BSA*
Spot 6	*BSA*	RBD (B.1.1.7)	*BSA*	Spike (BQ.1.1)	RBD (XBB.1)
Spot 7	Spike (BA.2.75)	RBD (BA.4; BA.5)	*BSA*	Spike (BA.2.75)	RBD (BA.4; BA.5)
Spot 8	Spike (BA.4)	RBD (BA.2.75)	Spike (BA.5)	Spike (BA.4.6)	RBD (BA.2.75)
Spot 9	Spike (B.1.351)	RBD (AY.3; AY.4; AY.4.2; AY.5; AY.6; AY.7; AY.12; AY.14; B.1.617.2; B.1.617.2+Δ144)	RBD (BA.4; BA.5)	Spike (BQ.1)	RBD (BQ.1)
Spot 10	Spike (BA.5)	SARS-CoV-2 S1 RBD	SARS-CoV-2 S1 RBD	Spike (BA.5)	SARS-CoV-2 S1 RBD

Note: Alternative S-GENE mutations for Spike of B.1.617.2 are listed as "**Alt Seq #**."

Plate Description	SARS-CoV-2 Plate 34	SARS-CoV-2 Key Variant Spike Plate 1	SARS-CoV-2 Key Variant RBD Plate 1
Spot 1	SARS-CoV-2 Spike	SARS-CoV-2 Spike	RBD (BA.2.12.1)
Spot 2	Spike (B.1.1.529; BA.1; BA.1.15)	Spike (BA.2.12.1)	RBD (B.1.351; B.1.351.1)
Spot 3	Spike (XBB.1)	SARS-CoV-2 Nucleocapsid	SARS-CoV-2 Nucleocapsid
Spot 4	Spike (BF.7)	Spike (BA.2.75)	RBD (B.1.1.529; BA.1; BA.1.15)
Spot 5	Spike (XBB.1.5)	Spike (BA.2; BA.2.1; BA.2.2; BA.2.3; BA.2.5; BA.2.6; BA.2.7; BA.2.8; BA.2.10; BA.2.12)	RBD (BA.2; BA.2.1; BA.2.2; BA.2.3; BA.2.5; BA.2.6; BA.2.7; BA.2.8; BA.2.10; BA.2.10.1; BA.2.12)
Spot 6	Spike (BQ.1.1)	Spike (B.1.1.529; BA.1; BA.1.15)	RBD (B.1.1.7)
Spot 7	Spike (BA.2.75)	Spike (B.1.617.2; AY.4) **Alt Seq 2**	RBD (AY.3; AY.4; AY.4.2; AY.5; AY.6; AY.7; AY.12; AY.14; B.1.617.2; B.1.617.2+ΔY144)
Spot 8	Spike (BN.1)	Spike (B.1.1.7)	RBD (BA.2.75)
Spot 9	Spike (BQ.1)	Spike (B.1.351)	RBD (BA.4; BA.5)
Spot 10	Spike (BA.5)	Spike (BA.5)	SARS-CoV-2 S1 RBD

Note: Alternative S-GENE mutations for Spike of B.1.617.2 are listed as "**Alt Seq #**."

Table 2. Antigen plates included in the V-PLEX COVID-19 Serology Mouse Kits

Kit	Plate(s) Included
V-PLEX SARS-CoV-2 Panel 1 (Mouse) Kit	SARS-CoV-2 Plate 1
V-PLEX SARS-CoV-2 Panel 2 (Mouse) Kit	SARS-CoV-2 Plate 2
V-PLEX SARS-CoV-2 Panel 5 (Mouse) Kit	SARS-CoV-2 Plate 5
V-PLEX SARS-CoV-2 Panel 6 (Mouse) Kit	SARS-CoV-2 Plate 6
V-PLEX SARS-CoV-2 Panel 7 (Mouse) Kit	SARS-CoV-2 Plate 7
V-PLEX SARS-CoV-2 Panel 8 (Mouse) Kit	SARS-CoV-2 Plate 8
V-PLEX SARS-CoV-2 Panel 9 (Mouse) Kit	SARS-CoV-2 Plate 9
V-PLEX SARS-CoV-2 Panel 11 (Mouse) Kit	SARS-CoV-2 Plate 11
V-PLEX SARS-CoV-2 Panel 12 (Mouse) Kit	SARS-CoV-2 Plate 12
V-PLEX SARS-CoV-2 Panel 13 (Mouse) Kit	SARS-CoV-2 Plate 13
V-PLEX SARS-CoV-2 Panel 14 (Mouse) Kit	SARS-CoV-2 Plate 14
V-PLEX SARS-CoV-2 Panel 15 (Mouse) Kit	SARS-CoV-2 Plate 15
V-PLEX SARS-CoV-2 Panel 16 (Mouse) Kit	SARS-CoV-2 Plate 16
V-PLEX SARS-CoV-2 Panel 17 (Mouse) Kit	SARS-CoV-2 Plate 17
V-PLEX SARS-CoV-2 Panel 18 (Mouse) Kit	SARS-CoV-2 Plate 18
V-PLEX SARS-CoV-2 Panel 19 (Mouse) Kit	SARS-CoV-2 Plate 19
V-PLEX SARS-CoV-2 Panel 20 (Mouse) Kit	SARS-CoV-2 Plate 20
V-PLEX SARS-CoV-2 Panel 22 (Mouse) Kit	SARS-CoV-2 Plate 22
V-PLEX SARS-CoV-2 Panel 23 (Mouse) Kit	SARS-CoV-2 Plate 23
V-PLEX SARS-CoV-2 Panel 24 (Mouse) Kit	SARS-CoV-2 Plate 24
V-PLEX SARS-CoV-2 Panel 25 (Mouse) Kit	SARS-CoV-2 Plate 25
V-PLEX SARS-CoV-2 Panel 26 (Mouse) Kit	SARS-CoV-2 Plate 26
V-PLEX SARS-CoV-2 Panel 27 (Mouse) Kit	SARS-CoV-2 Plate 27
V-PLEX SARS-CoV-2 Panel 28 (Mouse) Kit	SARS-CoV-2 Plate 28
V-PLEX SARS-CoV-2 Panel 29 (Mouse) Kit	SARS-CoV-2 Plate 29
V-PLEX SARS-CoV-2 Panel 30 (Mouse) Kit	SARS-CoV-2 Plate 30
V-PLEX SARS-CoV-2 Panel 31 (Mouse) Kit	SARS-CoV-2 Plate 31
V-PLEX SARS-CoV-2 Panel 32 (Mouse) Kit	SARS-CoV-2 Plate 32
V-PLEX SARS-CoV-2 Panel 33 (Mouse) Kit	SARS-CoV-2 Plate 33
V-PLEX SARS-CoV-2 Panel 34 (Mouse) Kit	SARS-CoV-2 Plate 34
V-PLEX SARS-CoV-2 Key Variant Spike Panel 1 (Mouse) Kit	SARS-CoV-2 Key Variant Spike Plate 1
V-PLEX SARS-CoV-2 Key Variant RBD Panel 1 (Mouse) Kit	SARS-CoV-2 Key Variant RBD Plate 1

Table 3. Reagents and Components

Reagent	Storage	Catalog Number	Size	Quantity Supplied	
				5-Plate Kit	25-Plate Kit
MULTI-SPOT 96-Well, 10-Spot plate	2–8 °C	—	10-Spot	5 plates	25 plates
SULFO-TAG Anti-Mouse IgG, IgM, or IgA Antibody (200X)♦	2–8 °C		200 µL		
SULFO-TAG Anti-Mouse IgG Antibody		D22AGQ-3		1 vial	5 vials
SULFO-TAG Anti-Mouse IgM Antibody		D22AGR-3		1 vial	5 vials
SULFO-TAG Anti-Mouse IgA Antibody		D22AGS-3		1 vial	5 vials
Diluent 100	2–8 °C	R50AA-2	200 mL	1 bottle	5 bottles
MSD Wash Buffer (20X)	RT	R61AA-1	100 mL	1 bottle	5 bottles
Blocker A	RT	R93BA-2	250 mL	1 bottle	5 bottles
MSD Phosphate Buffer (5X)	RT	R93SA-2	50 mL	1 bottle	5 bottles
MSD GOLD™ Read Buffer B	RT	R60AM-2	90 mL	1 bottle	5 bottles
Microplate Adhesive Film	RT	—	—	15 sheets	75 sheets

RT = room temperature

♦ Kits use goat polyclonal IgG, IgM, or IgA as detection antibody

Table 4. Information about the SARS-CoV-2 variant antigens included in V-PLEX COVID-19 Serology Mouse Kits

SARS-CoV-2 Spike Antigens

Lineages	Amino Acid Modifications	Common Designation
A.23.1	F157L, V367F, Q613H, P681R	Uganda
A.VOI.V2	D80Y, ΔY144, ΔI210, D215G, Δ246-248, L249M, W258L, R346K, T478R, E484K, H655Y, P681H, Q957H	Tanzania
AY.1	T19R, Δ157/158, K417N, L452R, T478K, D614G, P681R, D950N	**Delta** sublineage
AY.1	**(Alt Seq 1):** T19R, T95I, G142D, E156G, Δ157/158, W258L, K417N, L452R, T478K, D614G, P681R, D950N	**Delta** sublineage
AY.2	T19R, V70F, G142D, Δ157/158, A222V, K417N, L452R, T478K, D614G, P681R, D950N	**Delta** sublineage
AY.2	**(Alt Seq 1):** T19R, V70F, G142D, E156G, Δ157/158, A222V, K417N, L452R, T478K, D614G, P681R, D950N	**Delta** sublineage
AY.4.2	T19R, T95I, G142D, Y145H, Δ156/157, R158G, A222V, L452R, T478K, D614G, P681R, D950N	**Delta** sublineage
AY.12	T19R, Δ156/157, R158G, L452R, T478K, D614G, P681R, D950N	**Delta** sublineage
BA.1+L452R	A67V, Δ69-70, T95I, G142D/Δ143-145, Δ211/L212I, ins214EPE, G339D, S371L, S373P, S375F, K417N, N440K, L452R, G446S, S477N, T478K, E484A, Q493R, G496S, Q498R, N501Y, Y505H, T547K, D614G, H655Y, N679K, P681H, N764K, D796Y, N856K, Q954H, N969K, L981F	**Omicron** sublineage
BA.1+R346K; BA.1.1; BA.1.1.15	A67V, Δ69-70, T95I, G142D/Δ143-145, Δ211/L212I, ins214EPE, G339D, R346K, S371L, S373P, S375F, K417N, N440K, G446S, S477N, T478K, E484A, Q493R, G496S, Q498R, N501Y, Y505H, T547K, D614G, H655Y, N679K, P681H, N764K, D796Y, N856K, Q954H, N969K, L981F	**Omicron** sublineages
BA.2; BA.2.1; BA.2.2; BA.2.3; BA.2.5; BA.2.6; BA.2.7; BA.2.8; BA.2.10; BA.2.12	T19I, (L24-A27)toS, G142D, V213G, G339D, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, S477N, T478K, E484A, Q493R, Q498R, N501Y, Y505H, D614G, H655Y, N679K, P681H, N764K, D796Y, Q954H, N969K	**Omicron** sublineages
BA.2+L452M	T19I(L24-A27)toS, G142D, V213G, G339D, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, L452M, S477N, T478K, E484A, Q493R, Q498R, N501Y, Y505H, D614G, H655Y, N679K, P681H, N764K, D796Y, Q954H, N969K	**Omicron** sublineage
BA.2+L452R	T19I, (L24-A27)toS, G142D, V213G, G339D, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, L452R, S477N, T478K, E484A, Q493R, Q498R, N501Y, Y505H, D614G, H655Y, N679K, P681H, N764K, D796Y, Q954H, N969K	**Omicron** sublineage
BA.2.12.1	T19I, (L24-A27)toS, G142D, V213G, G339D, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, L452Q, S477N, T478K, E484A, Q493R, Q498R, N501Y, Y505H, D614G, H655Y, N679K, P681H, S704LN764K, D796Y, Q954H, N969K	**Omicron** sublineage
BA.2.75	T19I, L24-A27>S, G142D, K147E, W152R, F157L, I210V, V213G, G257S, G339H, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, G446S, N460K, S477N, T478K, E484A, Q498R, N501Y, Y505H, D614G, H655Y, N679K, P681H, N764K, D796Y, Q954H, N969K	**Omicron** sublineage
BA.2.75.2	T19I, L24-A27>S, G142D, K147E, W152R, F157L, I210V, V213G, G257S, G339H, R346T, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, G446S, N460K, S477N, T478K, E484A, F486S, Q498R, N501Y, Y505H, D614G, H655Y, N679K, P681H, N764K, D796Y, Q954H, N969K, D1199N	**Omicron** sublineage
BA.3	A67V, H69-V70del, T95I, G142D, V143-Y145del, (N211-L212)tol, G339D, S371F, S373P, S375F, D405N, K417N, N440K, G446S, S477N, T478K, E484A, Q493R, Q498R, N501Y, Y505H, D614G, H655Y, N679K, P681H, N764K, D796Y, Q954H, N969K	**Omicron** sublineage

Lineages	Amino Acid Modifications	Common Designation
BA.4	T19I, (L24-A27)toS, del69/70, G142D, V213G, G339D, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, L452R, S477N, T478K, E484A, F486V, Q498R, N501Y, Y505H, D614G, H655Y, N658S, N679K, P681H, N764K, D796Y, Q954H, N969K	**Omicron** sublineage
BA.4.6	V3G, T19I, L24-A27>S, H69-V70del, G142D, V213G, G339D, R346T, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, L452R, S477N, T478K, E484A, F486V, Q498R, N501Y, Y505H, D614G, H655Y, N658S, N679K, P681H, N764K, D796Y, Q954H, N969K	**Omicron** sublineage
BA.5	T19I, (L24-A27)toS, del69/70, G142D, V213G, G339D, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, L452R, S477N, T478K, E484A, F486V, Q498R, N501Y, Y505H, D614G, H655Y, N679K, P681H, N764K, D796Y, Q954H, N969K	**Omicron** sublineage
BF.7	T19I, L24-A27>S, H69-V70del, G142D, V213G, G339D, R346T, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, L452R, S477N, T478K, E484A, F486V, Q498R, N501Y, Y505H, D614G, H655Y, N679K, P681H, N764K, D796Y, Q954H, N969K	**Omicron** sublineage
BN.1	T19I, L24-A27>S, G142D, K147E, W152R, F157L, I210V, V213G, G257S, G339H, R346T, K356T, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, G446S, N460K, S477N, T478K, E484A, F490S, Q498R, N501Y, Y505H, D614G, H655Y, N679K, P681H, N764K, D796Y, Q954H, N969K	**Omicron** sublineage
BQ.1	T19I, L24-A27>S, H69-V70del, G142D, V213G, G339D, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, K444T, L452R, N460K, S477N, T478K, E484A, F486V, Q498R, N501Y, Y505H, D614G, H655Y, N679K, P681H, N764K, D796Y, Q954H, N969K	**Omicron** sublineage
BQ.1.1	T19I, L24-A27>S, H69-V70del, G142D, V213G, G339D, R346T, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, K444T, L452R, N460K, S477N, T478K, E484A, F486V, Q498R, N501Y, Y505H,D614G, H655Y, N679K, P681H, N764K, D796Y, Q954H, N969K	**Omicron** sublineage
BV-1	Δ H69-V70, ΔY144, Q493R, N501Y, A570D, D614G, P681H, T716I, S982A, D1118H	Texas BV-1
B.1	D614G	-
B.1.1.519	T478K, D614G, P681H, T732A	Mexico/Texas BV-2
B.1.1.529; BA.1; BA.1.15	A67V, ΔH69-V70, T95I, G142D, Δ143-145, Δ211/L212I, ins214EPE, G339D, S371L, S373P, S375F, K417N, N440K, G446S, S477N, T478K, E484A, Q493R, G496S, Q498R, N501Y, Y505H, T547K, D614G, H655Y, N679K, P681H, N764K, D796Y, N856K, Q954H, N969K, L981F	**Omicron** sublineages
B.1.1.7	ΔH69-V70, ΔY144, N501Y, A570D, D614G, P681H, T716I, S982A, D1118H	**Alpha**
B.1.1.7+E484K	Δ H69-V70, ΔY144, E484K, N501Y, A570D, D614G, P681H, T716I, S982A, D1118H	U.K.
B.1.258.17	Δ H69-V70, L189F, N439K, D614G, V772I	Europe
B.1.351	L18F, D80A, D215G, Δ242-244, R246I, K417N, E484K, N501Y, D614G, A701V	**Beta**
B.1.351.1	D80A, D215G, K417N, E484K, N501Y, D614G, A701V	Botswana
B.1.429	S13I, W152C, L452R, D614G	**Epsilon**
B.1.466.2	W152R, N439K, D614G, P681R	Indonesia
B.1.525	Q52R, A67V, Δ H69-V70, Δ Y144, E484K, Q677H, D614G, F888L	**Eta**
B.1.526	L5F, T95I, D253G, E484K, D614G, A701V	**Iota**
B.1.526.1	D80G, ΔY144, F157S, L452R, D614G, T859N, D950H	New York
B.1.617	L452R, E484Q, D614G	India
B.1.617.1	T95I, G142D, E154K, L452R, E484Q, D614G, P681R, Q1071H	**Kappa**
B.1.617.2	T19R, Δ157/158, L452R, T478K, D614G, P681R, D950N	**Delta** sublineage
B.1.617.2; AY.3; AY.5; AY.6; AY.7; AY.14	**(Alt Seq 1):** T19R, G142D, Δ156/157, R158G, L452R, T478K, D614G, P681R, D950N	**Delta** sublineages
B.1.617.2 +1	T19R, G142D, Δ156/157, R158G, L452R, T478K, E484K, D614G, P681R, D950N	**Delta** +1
B.1.617.2 +2	T19R, G142D, Δ156/157, R158G, L452R, T478K, E484K, N501Y, D614G, P681R, D950N	**Delta** +2
B.1.617.2 +3	T19R, G142D, Δ156/157, R158G, K417N, L452R, T478K, E484K, N501Y, D614G, P681R, D950N	**Delta** +3
B.1.617.2 +4	T19R, G142D, Δ156/157, R158G, K417N, N439K, L452R, T478K, E484K, N501Y, D614G, P681R, D950N	**Delta** +4
B.1.617.2; AY.4	**(Alt Seq 2):** T19R, T95I, G142D, Δ 156/157, R158G, L452R, T478K, D614G, P681R, D950N	**Delta** sublineages
B.1.617.2+ΔY144	T19R, Δ Y144, Δ 157/158, L452R, T478K, D614G, P681R, D950N	Vietnam
B.1.617.3	T19R, G142D, L452R, E484Q, D614G, P681R, D950N	India
B.1.618	Δ Y145/146, E484K, D614G	India
B.1.620	P26S, Δ H69-V70, V126A, Δ Y144, Δ 242-244, H245Y, S477N, E484K, D614G, P681H, T1027I, D1118H	Europe
B.1.621	T95I, Y144T, Y145S, ins146N, R346K, E484K, N501Y, D614G, P681H, D950N	**Mu**
B.1.640.2	P9L, E96Q, C136-Y144del, R190S, D215H, R346S, N394S, Y449N, E484K, F490S, N501Y, D614G, P681H, T859N, D1139H	France (IHU)
C.37	G75V, T76I, ΔR246, ΔS247, ΔY248, ΔL249, ΔT250, ΔP251, ΔG252, D253N, L452Q, F490S, D614G, T859N	**Lambda**

Lineages	Amino Acid Modifications	Common Designation
P.1	L18F, T20N, P26S, D138Y, R190S, K417T, E484K, N501Y, D614G, H655Y, T1027I, V1176F	**Gamma**
P.2	E484K, D614G, V1176F	**Zeta**
P.3	Δ141-143, E484K, N501Y, D614G, P681H, E1092K, H1101Y, V1176F	Philippines
R.1	W152L, E484K, D614G, G769V	Kentucky
XBB.1	T19I, L24-A27>S, G142D, Y144del, H146Q, Q183E, V213E, G252V, G339H, R346T, L368I, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, V445P, G446S, N460K, S477N, T478K, E484A, F486S, F490S, Q498R, N501Y, Y505H, D614G, H655Y, N679K, P681H, N764K, D796Y, Q954H, N969K	**Omicron** sublineage
XBB.1.5	T19I, L24-A27>S, G142D, Y144del, H146Q, Q183E, V213E, G252V, G339H, R346T, L368I, S371F,S373P, S375F, T376A, D405N, R408S, K417N, N440K, V445P, G446S, N460K, S477N, T478K, E484A, F486P, F490S, Q498R, N501Y, Y505H, D614G, H655Y, N679K, P681H, N764K, D796Y, Q954H, N969K	**Omicron** sublineage

- = Not applicable
Note: Alternative S-GENE mutations for Spike of AY.1, AY.2, and B.1.617.2 are listed as "**Alt Seq #**."

SARS-CoV-2 S1 RBD Antigens

Lineages	Amino Acid Modifications	Common Designation
A.23.1	V367F	Uganda
A.VOI.V2	R346K, T478R, E484K	Tanzania
AY.1; AY.2	K417N, L452R, T478K	**Delta** sublineages
AY.3; AY.4; AY.4.2; AY.5; AY.6; AY.7; AY.12; AY.14; B.1.617.2; B.1.617.2+ΔY144	L452R, T478K	**Delta** sublineages
BA.2; BA.2.1; BA.2.2; BA.2.3; BA.2.5; BA.2.6; BA.2.7; BA.2.8; BA.2.10; BA.2.10.1; BA.2.12	G339D, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, S477N, T478K, E484A, Q493R, Q498R, N501Y, Y505H	**Omicron** sublineages
BA.2+L452M	G339D, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, L452M, S477N, T478K, E484A, Q493R, Q498R, N501Y, Y505H	**Omicron** sublineage
BA.2+L452R	G339D, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, L452R, S477N, T478K, E484A, Q493R, Q498R, N501Y, Y505H	**Omicron** sublineage
BA.2.12.1	G339D, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, L452Q, S477N, T478K, E484A, Q493R, Q498R, N501Y, Y505H	**Omicron** sublineage
BA.2.75	G339H, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, G446S, N460K, S477N, T478K, E484A, Q498R, N501Y, Y505H	**Omicron** sublineage
BA.2.75.2	G339H, R346T, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, G446S, N460K, S477N, T478K, E484A, F486S, Q498R, N501Y, Y505H	**Omicron** sublineage
BA.3	G339D, S371F, S373P, S375F, D405N, K417N, N440K, G446S, S477N, T478K, E484A, Q493R, Q498R, N501Y, Y505H	**Omicron** sublineage
BA.4; BA.5	G339D, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, L452R, S477N, T478K, E484A, F486V, Q498R, N501Y, Y505H	**Omicron** sublineages
BA.4.6; BF.7	G339D, R346T, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, L452R, S477N, T478K, E484A, F486V, Q498R, N501Y, Y505H	**Omicron** sublineages
BQ.1	G339D, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, K444T, L452R, N460K, S477N, T478K, E484A, F486V, Q498R, N501Y, Y505H	**Omicron** sublineage
BQ.1.1	G339D, R346T, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, K444T, L452R, N460K, S477N, T478K, E484A, F486V, Q498R, N501Y, Y505H	**Omicron** sublineage
BV-1	Q493R, N501Y	Texas BV-1
B.1.1.519	T478K	Mexico/Texas BV-2
B.1.1.529; BA.1; BA.1.15	G339D, S371L, S373P, S375F, K417N, N440K, G446S, S477N, T478K, E484A, Q493R, G496S, Q498R, N501Y, Y505H	**Omicron** sublineages
BA.1.1; BA.1.1.15	G339D, R346K, S371L, S373P, S375F, K417N, N440K, G446S, S477N, T478K, E484A, Q493R, G496S, Q498R, N501Y, Y505H	**Omicron** sublineages
B.1.1.7	N501Y	**Alpha**
B.1.1.7+E484K; P.3	E484K, N501Y	U.K.; Philippines
B.1.214.2	Q414K, N450K	Belgium
B.1.258.17; B.1.466.2	N439K	Europe; Indonesia
B.1.351; B.1.351.1	K417N, E484K, N501Y	**Beta;** Botswana
B.1.427; B.1.429; B.1.526.1	L452R	**Epsilon** lineages; New York
B.1.525; B.1.526; B.1.618; P.2; R.1	E484K	**Eta; Iota;** India**; Zeta;** Kentucky

Lineages	Amino Acid Modifications	Common Designation
B.1.526.2	S477N	New York
B.1.617; B.1.617.1; B.1.617.3	L452R, E484Q	India; **Kappa**; India
B.1.620	S477N, E484K	Europe
C.37	L452Q, F490S	**Lambda**
P.1	K417T, E484K, N501Y	**Gamma**
XBB.1	G339H, R346T, L368I, S371F, S373P, S375F, T376A, D405N, R408S, K417N, N440K, V445P, G446S, N460K, S477N, T478K, E484A, F486S, F490S, Q498R, N501Y, Y505H	**Omicron** sublineage

Additional Materials and Equipment

- ❑ Appropriately sized tubes for reagent preparation
- ❑ Deionized water
- ❑ 0.2 µm filter needed for Blocker A preparation
- ❑ 96-well plates
- ❑ Microtiter plate shaker capable of shaking at ~700 rpm
- ❑ Microcentrifuge tubes for making serial dilutions
- ❑ Automated plate washer or other efficient multi-channel pipetting equipment for washing 96-well plates
- ❑ Appropriate liquid handling equipment for desired throughput capable of accurately dispensing 50 µL and 150 µL into a 96-well microplate
- ❑ Vortex mixer

Safety

Use safe laboratory practices and wear gloves, safety glasses, and laboratory coats when handling kit 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(s) (SDS), which can be obtained from MSD Customer Service or at www.mesoscale.com®.

Best Practices

- Mixing or substituting reagents from different sources or different kit lots is not recommended. Lot information is provided in the lot-specific certificate of analysis (COA).
- Assay incubation steps should be performed at 20-26 ºC to maximize consistency in signals between runs.
- Avoid prolonged exposure of the detection ACE2 protein (stock or diluted) to light. During the antibody incubation step, plates do not need to be shielded from light except for direct sunlight.
- Avoid bubbles in wells at all pipetting steps as they may lead to variable results. Bubbles introduced when adding read buffer may interfere with signal detection.
- Do not touch the pipette tip on the bottom of the wells when pipetting into the MSD plate.
- Use reverse pipetting when necessary to avoid introduction of bubbles. For empty wells, pipette gently to the bottom corner. Do not touch the pipette tip to the bottom of the wells when pipetting into the MSD plate.
- Plate shaking should be vigorous, with a rotary motion between 500-1,000 rpm. Binding reactions may reach equilibrium sooner if shaken in the middle of this range (~700 rpm) or above.
- When performing manual plate washing using a multi-channel pipette, plates should be washed using at least 150 µL of wash buffer per well. Excess residual volume after washing should be removed by gently tapping the plate on a paper towel.
- Do not allow plates to dry after washing steps. Solutions associated with the next assay step should be added to the plate immediately after washing.
- Make sure that the read buffer is at room temperature when adding to the plate.
- To improve interplate precision, keep time intervals consistent between adding read buffer and reading the plate. Unless otherwise directed, read the plate as soon as possible after adding read buffer.
- Do not shake the plate after adding read buffer.
- Remove the plate seals before reading the plate.
- If the sample results are above the top of the calibration curve, dilute the samples, and repeat the assay.
- We do not recommend using a partial plate when running this panel.

Recommended Protocol

Bring all plates and diluents to room temperature. Thaw samples on ice and equilibrate to room temperature before loading into the plates.

Prepare Blocker A Solution

Follow the preparation procedure in the product insert provided with the Blocker A Kit to prepare the Blocker A solution. You may store unused Blocker A solution according to the instructions in the Blocker A product insert available at www.mesoscale.com.

Prepare Wash Buffer

MSD provides 100 mL of Wash Buffer as a 20X stock solution. Dilute the stock solution before use. PBS + 0.05% Tween-20 can be used as an alternative to MSD Wash Buffer.

For one plate, combine:

- ❑ 15 mL of MSD Wash Buffer (20X)
- ❑ 285 mL of deionized water

Assay and Antibody Diluent

Use Diluent 100 as assay and antibody diluent.

STEP 1: Blocker A Addition

- ❑ Remove the plate from its packaging.
- ❑ Add 150 µL/well of Blocker A solution to the plate.
- ❑ Seal the plate with an adhesive plate seal and incubate at room temperature with shaking (~700 rpm) for at least 30 minutes.

During this time, prepare samples.

Sample Preparation

Prepare the samples by diluting with Diluent 100. The optimal dilution for mouse serum and plasma samples should be determined empirically by the user. Typically, samples are measured at a dilution between 10-fold and 100-fold. Lower dilutions keep negative or low samples in the measurable range; higher dilutions prevent saturation of signal with strongly positive samples. This protocol provides guidance for preparing a 100-fold dilution using an intermediate 10-fold dilution. Additional diluent can be purchased at www.mesoscale.com.

Note: Sample types other than serum and plasma are more variable in their composition. Users should run a pilot dilution series to determine the optimal dilution for these samples.

This protocol provides guidance for preparing a 100-fold diluted sample.

1. To make an intermediate 1:10 dilution in a 2 mL tube, or 96-well plate, combine:
    - 10 µL of sample
    - 90 µL of Diluent 100

2. To make a 1:100 dilution in a 2 mL tube, or 96-well plate, combine:
    - 15 µL of the 1:10 dilution from Step 1
    - 145 µL of Diluent 100

    Note: Prepared volume is enough to run samples in duplicate.

STEP 2: Sample Addition

After the Blocker A incubation step, wash the plate 3 times with at least 150 µL/well of 1X MSD Wash buffer.

- ❑ Add 50 µL/well of diluted samples to the plate.
- ❑ Seal the plate with an adhesive plate seal and incubate at room temperature with shaking (~700 rpm) for 2 hours.

During this time, prepare detection antibody solution.

Detection Antibody Solution Preparation

Detection antibody is provided as a 200X (400 µg/mL) stock solution. The working solution is 1X (2 µg/mL). You will need 6 mL of working solution per plate.

To prepare a 1X working solution of detection antibody, combine:

- ❑ 5,970 µL of Diluent 100
- ❑ 30 µL of 200X SULFO-TAG anti-Mouse Ig Antibody

STEP 3: Detection Antibody Addition

After the sample incubation step, wash the plate 3 times with at least 150 µL/well of 1X MSD Wash buffer.

- ❑ Add 50 µL/well of 1X detection antibody solution to the plate.
- ❑ Seal the plate with an adhesive plate seal and incubate at room temperature with shaking (~700 rpm) for 1 hour.

STEP 4: Read Buffer Addition

After the detection antibody incubation step, wash the plate 3 times with at least 150 µL/well of 1X MSD Wash buffer.

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

- ❑ Add 150 µL/well of the MSD GOLD Read Buffer B to the plate.
- ❑ Read the plate on the MSD instrument. No incubation in read buffer is required before reading the plate. Read plate immediately after adding read buffer. Do not shake the plate after adding read buffer.

STEP 5: Analysis of Results

The V-PLEX COVID-19 Serology Mouse Kits employ a sandwich immunoassays technique. Thus, the intensity of the ECL signal produced by each assay is directly proportional to the amount of mouse antibodies present in the samples. Background signals for normal samples and assay diluent (Diluent 100) should be established to understand the baseline for comparing the signal from positive samples.

Users may also consider incorporating positive and negative control samples into each plate to aid in normalization or calibration.

Protocol at a Glance

Note: Bring all plates and diluents to room temperature. Thaw samples on ice and equilibrate to room temperature before loading into the plates.

- ❑ Add Blocker A solution; incubate for at least 30 minutes, wash.
- ❑ Add samples. Incubate for 2 hours and wash.
- ❑ Add Detection Antibody solution. Incubate for 1 hour and wash.
- ❑ Add Read Buffer and analyze plate.

Appendix A

Coated Antigens

Antigens	Antigen Description *	Antigen Modifications
SARS-CoV-2 Nucleocapsid	Severe Acute Respiratory Syndrome Coronavirus 2 Nucleocapsid Protein	Full length Nucleocapsid; C-terminal His-Tag
SARS-CoV-2 S1 NTD	Severe Acute Respiratory Syndrome Coronavirus 2 N-Terminal Domain of the S1 subunit	Q14-L303 of the SARS-CoV-2 Spike Sequence; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 S1 RBD	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 Spike	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 S1 RBD (A.23.1)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Uganda variant A.23.1 lineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (A.VOI.V2)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Mexico/Texas BV-2 variant B.1.1.519 lineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (AY.1; AY.2)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Delta variant AY.1 and AY.2 sublineages	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (AY.3; AY.4; AY.4.2; AY.5; AY.6; AY.7; AY.12; AY.14; B.1.617.2; B.1.617.2+ΔY144	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Delta variant AY.3, AY.4, AY.4.2, AY.5, AY.6, AY.7, AY.12, AY.14, B.1.617.2, and B.1.617.2+ΔY144 sublineages	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (BA.1.1; BA.1.1.15)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Omicron variant BA.1.1 and BA.1.1.15 sublineages	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (BA.2; BA.2.1; BA.2.2; BA.2.3; BA.2.5; BA.2.6; BA.2.7; BA.2.8; BA.2.10; BA.2.10.1; BA.2.12)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Omicron variant BA.2, BA.2.1, BA.2.2, BA.2.3, BA.2.5, BA.2.6, BA.2.7, BA.2.8, BA.2.10, BA.2.10.1, and BA.2.12 sublineages	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (BA.2+L452M)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Omicron variant BA.2+L452M sublineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (BA.2+L452R)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Omicron variant BA.2+L452R sublineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (BA.2.12.1)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Omicron variant BA.2.12.1 sublineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (BA.2.75)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Omicron variant BA.2.75 sublineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (BA.2.75.2)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Omicron variant BA.2.75.2 sublineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag:
SARS-CoV-2 S1 RBD (BA.3)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Omicron variant BA.3 sublineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (BA.4; BA.5)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Omicron variant BA.4 and BA.5 sublineages	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag

Antigens	Antigen Description *	Antigen Modifications
SARS-CoV-2 S1 RBD (BA.4.6; BF.7)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Omicron variant BA.4.6 and BF.7 sublineages	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag:
SARS-CoV-2 S1 RBD (BQ.1)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Omicron variant BQ.1 sublineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag:
SARS-CoV-2 S1 RBD (BQ.1.1)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Omicron variant BQ.1.1 sublineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag:
SARS-CoV-2 S1 RBD (BV-1)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Texas BV-1 variant	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (B.1.1.519)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Mexico/Texas BV-2 variant B.1.1.519 lineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (B.1.1.529; BA.1; BA.1.15)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Omicron variant B.1.1.529, BA.1, and BA.1.15 sublineages	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (B.1.1.7)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Alpha Variant B.1.1.7 lineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (B.1.1.7+E484K; P3)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit U.K. variant B.1.1.7+E484K lineage and Philippines variant P.3 lineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (B.1.214.2)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Belgium variant B.1.214.2 lineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (B.1.258.17; B.1.466.2)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Europe variant B.1.258.17 lineage and Indonesia variant B.1.466.2 lineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (B.1.351; B.1.351.1)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Beta variant B.1.351 lineage and Botswana variant B.1.351.1 lineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (B.1.427; B.1.429; B.1.526.1)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Epsilon variant B.1.427 and B.1.429 lineages, and New York variant B.1.526.1 lineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (B.1.525; B.1.526; B.1.618; P.2; R.1)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Eta variant B.1.525 lineage, Iota variant B.1.526 lineage, India variant B.1.618 lineage, Zeta variant P.2 lineage, and Kentucky variant R.1 lineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (B.1.526.2)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit New York variant B.1.526.2 lineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (B.1.617; B.1.617.1; B.1.617.3)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit India variant B.1.617 and B.1.617.3 lineages, and Kappa variant B.1.617.1 lineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (B.1.620)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Europe variant B.1.620 lineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (C.37)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Lambda variant C.37 lineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (P.1)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Gamma variant P.1 lineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag
SARS-CoV-2 S1 RBD (XBB.1)	Severe Acute Respiratory Syndrome Coronavirus 2 Receptor Binding Domain of the S1 subunit Omicron variant XBB.1 sublineage	R319-F541 of the SARS-CoV-2 Spike Sequence; C-terminal His-Tag:
SARS-CoV-2 Spike (D614G)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein D614G	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (A.23.1)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Uganda variant A.23.1 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (A.VOI.V2)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Tanzania variant A variant of interest	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (AY.1)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Delta variant AY.1 sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (AY.1) **Alt Seq 1**	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Delta variant AY.1 sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag; **Alt Seq 1**
SARS-CoV-2 Spike (AY.2)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Delta variant AY.2 sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (AY.2) **Alt Seq 1**	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Delta variant AY.2 sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag**; Alt Seq 1**

Antigens	Antigen Description *	Antigen Modifications
SARS-CoV-2 Spike (AY.4.2)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Delta variant AY.4.2 sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (AY.12)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Delta variant AY.12 sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (BA.1+L452R)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Omicron variant BA.1+L452R sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (BA.1+R346K; BA.1.1; BA.1.1.15)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Omicron variant BA.1+R346K, BA.1.1, and BA.1.1.15 sublineages	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (BA.2; BA.2.1; BA.2.2; BA.2.3; BA.2.5; BA.2.6; BA.2.7; BA.2.8; BA.2.10; BA.2.12)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Omicron variant BA.2, BA.2.1, BA.2.2, BA.2.3, BA.2.5, BA.2.6, BA.2.7, BA.2.8, BA.2.10, and BA.2.12 sublineages	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (BA.2+L452M)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Omicron variant BA.2+L452M sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (BA.2+L452R)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Omicron variant BA.2+L452R sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (BA.2.12.1)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Omicron variant BA.2.12.1 sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (BA.2.75)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Omicron variant BA.2.75 sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (BA.2.75.2)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Omicron variant BA.2.75.2 sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (BA.3)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Omicron variant BA.3 sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (BA.4)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Omicron variant BA.4 sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (BA.4.6)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Omicron variant BA.4.6 sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (BA.5)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Omicron variant BA.5 sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (BF.7)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Omicron variant BF.7 sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (BN.1)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Omicron variant BN.1 sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (BQ.1)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Omicron variant BQ.1 sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (BQ.1.1)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Omicron variant BQ.1.1 sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (BV-1)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Texas BV-1 variant	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.1.519)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Mexico/Texas BV-2 variant B.1.1.519 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.1.529; BA.1; BA.1.15)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Omicron variant B.1.1.529, BA.1, and BA.1.15 sublineages	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.1.7)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Alpha. variant B.1.1.7 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.1.7+E484K)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein U.K. variant B.1.1.7+E484K lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.258.17)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Europe variant B.1.258.17 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.351)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Beta variant B.1.351 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.351.1)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Botswana variant B.1.351.1 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.429)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Epsilon variant B.1.429 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.466.2)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Indonesia variant B.1.466.2 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag

Antigens	Antigen Description *	Antigen Modifications
SARS-CoV-2 Spike (B.1.525)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Eta variant B.1.525 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.526)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Iota variant B.1.526 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.526.1)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein New York variant B.1.526.2 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.617)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein India variant B.1.617 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.617.1)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Kappa variant B.1.617.1 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.617.2)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Delta variant B.1.617.2 sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.617.2; AY.3; AY.5; AY.6; AY.7; AY.14) **Alt Seq 1**	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Delta variant B.1.617.2, AY.3, AY.5, AY.6, AY.7, and AY.14 sublineages	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag **(Alt Seq 1):**
SARS-CoV-2 Spike (B.1.617.2 +1)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Delta +1 variant	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.617.2 +2)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Delta +2 variant	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.617.2 +3)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Delta +3 variant	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.617.2 +4)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Delta +4 variant	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.617.2; AY.4) **Alt Seq 2**	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Delta variant B.1.617.2 and AY.4 sublineages	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag; **Alt Seq 2**
SARS-CoV-2 Spike (B.1.617.2+ΔY144)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Vietnam variant B.1.617.2+ΔY144 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.617.3)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein India variant B.1.617.3 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.618)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein India variant B.1.618 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.620)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Europe variant B.1.620 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.621)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Mu variant B.1.621 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (B.1.640.2)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein France (IHU) variant B.1.640.2 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (C.37)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Lambda variant C.37 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (P.1)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Gamma variant P.1 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (P.2)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Zeta variant P.2 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (P.3)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Philippines variant P.3 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (R.1)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Kentucky variant R.1 lineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (XBB.1)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Omicron variant XBB.1 sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-2 Spike (XBB.1.5)	Severe Acute Respiratory Syndrome Coronavirus 2 Spike Protein Omicron variant XBB.1.5 sublineage	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag
SARS-CoV-1 Spike	Severe Acute Respiratory Syndrome Coronavirus 1 Spike Protein	Soluble ectodomain with T4 trimerization domain; C-terminal Strep-Tag and His-Tag

*EXPI293 cell line used as an expression system

Note: Alternative S-GENE mutations for Spike of AY.1, AY.2, and B.1.617.2 are listed as "**Alt Seq #**."

Catalog Numbers

Table 5. Catalog Numbers for COVID-19 Serology Mouse Kits

Kit Name	IgG		IgM		IgA	
	5-Plate Kit	25-Plate Kit	5-Plate Kit	25-Plate Kit	5-Plate Kit	25-Plate Kit
Multiplex Kits on the MULTI-SPOT 96-Well, 10-Spot plate						
V-PLEX SARS-CoV-2 Panel 1 (Mouse) Kit	K15472U-2	K15472U-4	K15473U-2	K15473U-4	K15474U-2	K15474U-4
V-PLEX SARS-CoV-2 Panel 2 (Mouse) Kit	K15475U-2	K15475U-4	K15476U-2	K15476U-4	K15477U-2	K15477U-4
V-PLEX SARS-CoV-2 Panel 5 (Mouse) Kit	K15478U-2	K15478U-4	K15479U-2	K15479U-4	K15480U-2	K15480U-4
V-PLEX SARS-CoV-2 Panel 6 (Mouse) Kit	K15481U-2	K15481U-4	K15482U-2	K15482U-4	K15483U-2	K15483U-4
V-PLEX SARS-CoV-2 Panel 7 (Mouse) Kit	K15484U-2	K15484U-4	K15485U-2	K15485U-4	K15486U-2	K15486U-4
V-PLEX SARS-CoV-2 Panel 8 (Mouse) Kit	K15487U-2	K15487U-4	K15488U-2	K15488U-4	K15489U-2	K15489U-4
V-PLEX SARS-CoV-2 Panel 9 (Mouse) Kit	K15490U-2	K15490U-4	K15491U-2	K15491U-4	K15492U-2	K15492U-4
V-PLEX SARS-CoV-2 Panel 11 (Mouse) Kit	K15506U-2	K15506U-4	K15507U-2	K15507U-4	K15508U-2	K15508U-4
V-PLEX SARS-CoV-2 Panel 12 (Mouse) Kit	K15509U-2	K15509U-4	K15510U-2	K15510U-4	K15511U-2	K15511U-4
V-PLEX SARS-CoV-2 Panel 13 (Mouse) Kit	K15512U-2	K15512U-4	K15513U-2	K15513U-4	K15514U-2	K15514U-4
V-PLEX SARS-CoV-2 Panel 14 (Mouse) Kit	K15495U-2	K15495U-4	K15496U-2	K15496U-4	K15497U-2	K15497U-4
V-PLEX SARS-CoV-2 Panel 15 (Mouse) Kit	K15503U-2	K15503U-4	K15504U-2	K15504U-4	K15505U-2	K15505U-4
V-PLEX SARS-CoV-2 Panel 16 (Mouse) Kit	K15520U-2	K15520U-4	K15521U-2	K15521U-4	K15522U-2	K15522U-4
V-PLEX SARS-CoV-2 Panel 17 (Mouse) Kit	K15528U-2	K15528U-4	K15529U-2	K15529U-4	K15530U-2	K15530U-4
V-PLEX SARS-CoV-2 Panel 18 (Mouse) Kit	K15536U-2	K15536U-4	K15537U-2	K15537U-4	K15538U-2	K15538U-4
V-PLEX SARS-CoV-2 Panel 19 (Mouse) Kit	K15544U-2	K15544U-4	K15545U-2	K15545U-4	K15546U-2	K15546U-4
V-PLEX SARS-CoV-2 Panel 20 (Mouse) Kit	K15555U-2	K15555U-4	K15556U-2	K15556U-4	K15557U-2	K15557U-4
V-PLEX SARS-CoV-2 Panel 22 (Mouse) Kit	K15563U-2	K15563U-4	K15564U-2	K15564U-4	K15565U-2	K15565U-4
V-PLEX SARS-CoV-2 Panel 23 (Mouse) Kit	K15571U-2	K15571U-4	K15572U-2	K15572U-4	K15573U-2	K15573U-4
V-PLEX SARS-CoV-2 Panel 24 (Mouse) Kit	K15579U-2	K15579U-4	K15580U-2	K15580U-4	K15581U-2	K15581U-4
V-PLEX SARS-CoV-2 Panel 25 (Mouse) Kit	K15587U-2	K15587U-4	K15588U-2	K15588U-4	K15589U-2	K15589U-4
V-PLEX SARS-CoV-2 Panel 26 (Mouse) Kit	K15597U-2	K15597U-4	K15598U-2	K15598U-4	K15599U-2	K15599U-4
V-PLEX SARS-CoV-2 Panel 27 (Mouse) Kit	K15610U-2	K15610U-4	K15611U-2	K15611U-4	K15612U-2	K15612U-4
V-PLEX SARS-CoV-2 Panel 28 (Mouse) Kit	K15618U-2	K15618U-4	K15619U-2	K15619U-4	K15620U-2	K15620U-4
V-PLEX SARS-CoV-2 Panel 29 (Mouse) Kit	K15628U-2	K15628U-4	K15629U-2	K15629U-4	K15630U-2	K15630U-4
V-PLEX SARS-CoV-2 Panel 30 (Mouse) Kit	K15636U-2	K15636U-4	K15637U-2	K15637U-4	K15638U-2	K15638U-4
V-PLEX SARS-CoV-2 Panel 31 (Mouse) Kit	K15646U-2	K15646U-4	K15647U-2	K15647U-4	K15648U-2	K15648U-4
V-PLEX SARS-CoV-2 Panel 32 (Mouse) Kit	K15672U-2	K15672U-4	K15673U-2	K15673U-4	K15674U-2	K15674U-4
V-PLEX SARS-CoV-2 Panel 33 (Mouse) Kit	K15680U-2	K15680U-4	K15681U-2	K15681U-4	K15682U-2	K15682U-4
V-PLEX SARS-CoV-2 Panel 34 (Mouse) Kit	K15694U-2	K15694U-4	K15695U-2	K15695U-4	K15696U-2	K15696U-4
V-PLEX SARS-CoV-2 Key Variant Spike Panel 1 (Mouse) Kit	K15655U-2	K15655U-4	K15656U-2	K15656U-4	K15657U-2	K15657U-4
V-PLEX SARS-CoV-2 Key Variant RBD Panel 1 (Mouse) Kit	K15663U-2	K15663U-4	K15664U-2	K15664U-4	K15665U-2	K15665U-4

Plate Diagram

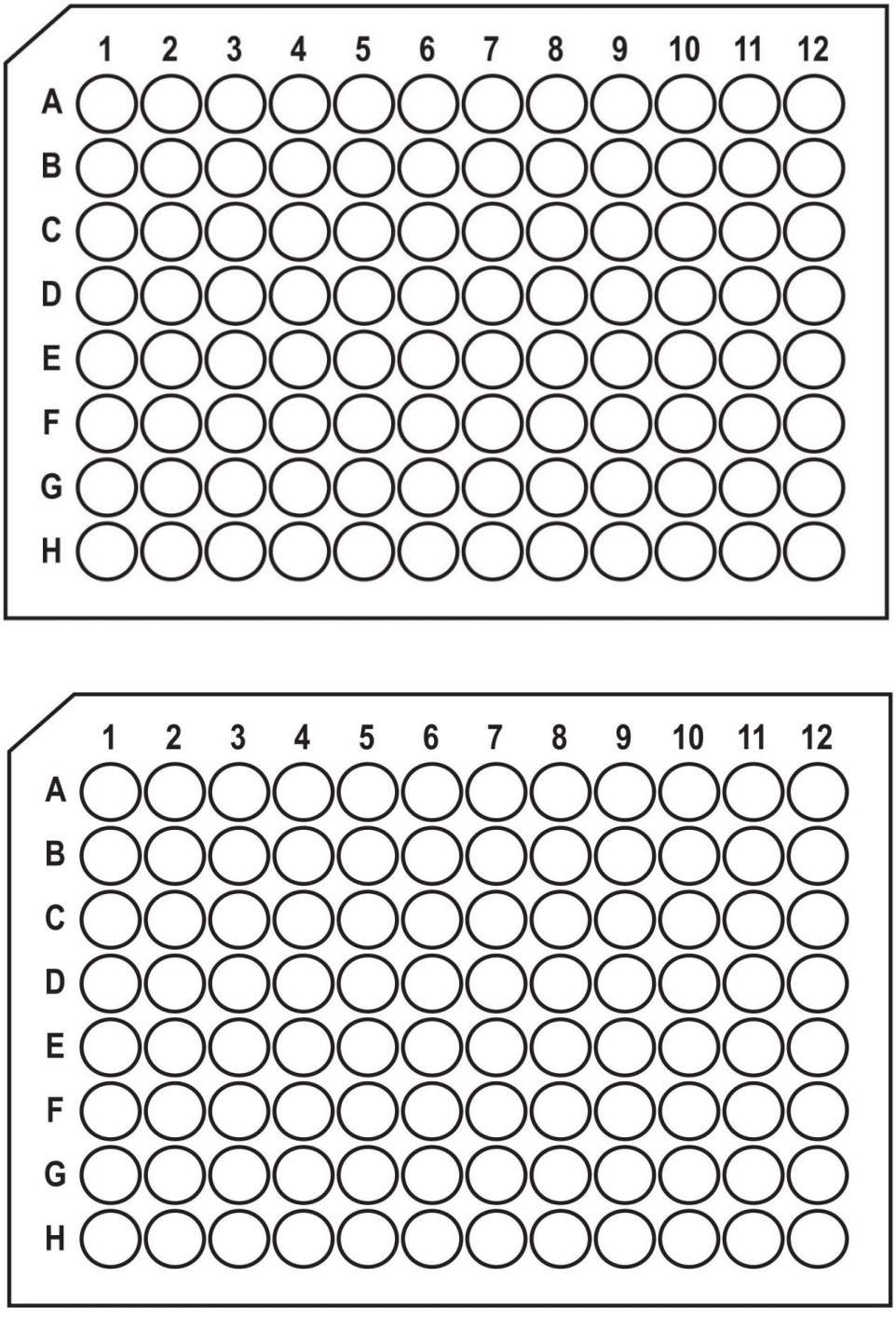

Figure 2. Plate diagram.