



EXTENSION MEMO


Page 1 of 1

Product Description(s): Reference Standard 1

Catalog Number(s) / Size(s): C00ADK-2

Lot Number: A0080286

Based on additional testing, the original date of expiration for this Reference Standard has been extended by 60 months. The expiration date of A0080286 has been extended to 28 FEB 2031.

Function	Name	Signature	Date
Quality	Karen Hamilla		06 MAY 2024

This memo supersedes all other statements regarding date of expiration for this product.



CERTIFICATE OF ANALYSIS

Product Description: Reference Standard 1

Catalog Number: C00ADK-2

Lot Number: A0080286

Storage Temperature: ≤-70°C

Expiration Date: 28 FEB 2026

Values are provided in two units - MSD Arbitrary Units/mL (AU/mL) and WHO Biological Arbitrary Units/mL (BAU/mL) (NIBSC 20/136).

WHO/NIBSC Units: MSD Units				
Antigen	Antibodies	Vialed	1:10	Unit of Measure
SARS-CoV-2 Nucleocapsid	IgG	1.65	0.165	BAU/mL
SARS-CoV-2 S1 RBD		7.89	0.789	BAU/mL
SARS-CoV-2 Spike		6.49	0.649	BAU/mL
SARS-CoV-2 Nucleocapsid	IgM	6.47		BAU/mL
SARS-CoV-2 S1 RBD		2.28		BAU/mL
SARS-CoV-2 Spike		2.82		BAU/mL
SARS-CoV-2 Nucleocapsid	IgA	12.2	1.22	BAU/mL
SARS-CoV-2 S1 RBD		4.69	0.469	BAU/mL
SARS-CoV-2 Spike		5.39	0.539	BAU/mL

Concentration Assignment of IgG Antibodies:

IgG: Use at 1:10 for all plate types

Assay	Alternate Name	Conc. of IgG (vialed)	Conc. of IgG (1:10)	Unit of Measure
SARS-CoV-2				
SARS-CoV-2 Nucleocapsid		700	70	AU/mL
SARS-CoV-2 S1 NTD		8.5	0.85	AU/mL
SARS-CoV-2 S1 RBD		290	29	AU/mL
SARS-CoV-2 Spike		720	72	AU/mL
SARS-CoV-2 S1 RBD (A.23.1)	V367F	330	33	AU/mL
SARS-CoV-2 S1 RBD (A.VOI.V2)	R346K, T478R, E484K	48	4.8	AU/mL
SARS-CoV-2 S1 RBD (AY.1)	K417N, L452R, T478K	130	13	AU/mL
SARS-CoV-2 S1 RBD (AY.2)	K417N, L452R, T478K	130	13	AU/mL
SARS-CoV-2 S1 RBD (AY.3)	L452R, T478K; RBD (Delta)	140	14	AU/mL
SARS-CoV-2 S1 RBD (AY.4)	L452R, T478K; RBD (Delta)	140	14	AU/mL
SARS-CoV-2 S1 RBD (AY.4.2)	L452R, T478K; RBD (Delta)	140	14	AU/mL
SARS-CoV-2 S1 RBD (AY.5)	L452R, T478K; RBD (Delta)	140	14	AU/mL
SARS-CoV-2 S1 RBD (AY.6)	L452R, T478K; RBD (Delta)	140	14	AU/mL
SARS-CoV-2 S1 RBD (AY.7)	L452R, T478K; RBD (Delta)	140	14	AU/mL
SARS-CoV-2 S1 RBD (AY.12)	L452R, T478K; RBD (Delta)	140	14	AU/mL
SARS-CoV-2 S1 RBD (AY.14)	L452R, T478K; RBD (Delta)	140	14	AU/mL
SARS-CoV-2 S1 RBD (B.1.1.519)	T478K	250	25	AU/mL

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



CERTIFICATE OF ANALYSIS

SARS-CoV-2 S1 RBD (B.1.1.529; BA.1)	RBD (Omicron; BA.1)	17	1.7	AU/mL
SARS-CoV-2 S1 RBD (B.1.1.7)	N501Y; RBD (Alpha)	180	18	AU/mL
SARS-CoV-2 S1 RBD (B.1.1.7+E484K)	E484K, N501Y	42	4.2	AU/mL
SARS-CoV-2 S1 RBD (B.1.214.2)	Q414K, N450K	170	17	AU/mL
SARS-CoV-2 S1 RBD (B.1.258.17)	N439K	100	10	AU/mL
SARS-CoV-2 S1 RBD (B.1.351)	K417N, E484K, N501Y; RBD (Beta)	44	4.4	AU/mL
SARS-CoV-2 S1 RBD (B.1.351.1)	K417N, E484K, N501Y; RBD (Beta)	44	4.4	AU/mL
SARS-CoV-2 S1 RBD (B.1.427)	L452R	160	16	AU/mL
SARS-CoV-2 S1 RBD (B.1.429)	L452R	160	16	AU/mL
SARS-CoV-2 S1 RBD (B.1.466.2)	N439K	100	10	AU/mL
SARS-CoV-2 S1 RBD (B.1.525)	E484K	73	7.3	AU/mL
SARS-CoV-2 S1 RBD (B.1.526)	E484K	73	7.3	AU/mL
SARS-CoV-2 S1 RBD (B.1.526.1)	L452R	160	16	AU/mL
SARS-CoV-2 S1 RBD (B.1.526.2)	S477N	270	27	AU/mL
SARS-CoV-2 S1 RBD (B.1.617)	L452R, E484Q	120	12	AU/mL
SARS-CoV-2 S1 RBD (B.1.617.1)	L452R, E484Q	120	12	AU/mL
SARS-CoV-2 S1 RBD (B.1.617.2)	L452R, T478K; RBD (Delta)	140	14	AU/mL
SARS-CoV-2 S1 RBD (B.1.617.2+ΔY144)	L452R, T478K; RBD (Delta)	140	14	AU/mL
SARS-CoV-2 S1 RBD (B.1.617.3)	L452R, E484Q	120	12	AU/mL
SARS-CoV-2 S1 RBD (B.1.618)	E484K	73	7.3	AU/mL
SARS-CoV-2 S1 RBD (B.1.620)	S477N, E484K	48	4.8	AU/mL
SARS-CoV-2 S1 RBD (BA.1.1)	RBD (Omicron; BA.1.1)	11	1.1	AU/mL
SARS-CoV-2 S1 RBD (BA.2)	RBD (Omicron; BA.2)	26	2.6	AU/mL
SARS-CoV-2 S1 RBD (BA.2+L452M)	RBD (BA.2+L452M)	23	2.3	AU/mL
SARS-CoV-2 S1 RBD (BA.2+L452R)	RBD (BA.2+L452R)	16	1.6	AU/mL
SARS-CoV-2 S1 RBD (BA.2.12.1)	RBD (BA.2.12.1)	22	2.2	AU/mL
SARS-CoV-2 S1 RBD (BA.2.75)	RBD (BA.2.75)	14	1.4	AU/mL
SARS-CoV-2 S1 RBD (BA.2.75.2)	RBD (BA.2.75.2)	12	1.2	AU/mL
SARS-CoV-2 S1 RBD (BA.3)	RBD (BA.3)	14	1.4	AU/mL
SARS-CoV-2 S1 RBD (BA.4; BA.5)	RBD (BA.4; BA.5)	21	2.1	AU/mL
SARS-CoV-2 S1 RBD (BA.4.6; BF.7)	RBD (BA.4.6;BF.7)	20	2.0	AU/mL
SARS-CoV-2 S1 RBD (BQ.1)	RBD (BQ.1)	19	1.9	AU/mL
SARS-CoV-2 S1 RBD (BQ.1.1)	RBD (BQ.1.1)	18	1.8	AU/mL
SARS-CoV-2 S1 RBD (BV-1)	Q493R, N501Y	130	13	AU/mL
SARS-CoV-2 S1 RBD (C.37)	L452Q, F490S	91	9.1	AU/mL
SARS-CoV-2 S1 RBD (P.1)	K417T, E484K, N501Y; RBD (Gamma)	70	7.0	AU/mL
SARS-CoV-2 S1 RBD (P.2)	E484K	73	7.3	AU/mL
SARS-CoV-2 S1 RBD (P.3)	E484K, N501Y	42	4.2	AU/mL
SARS-CoV-2 S1 RBD (R.1)	E484K	73	7.3	AU/mL
SARS-CoV-2 S1 RBD (XBB.1)	RBD (XBB.1)	11	1.1	AU/mL
SARS-CoV-2 Spike (A.23.1)		850	85	AU/mL
SARS-CoV-2 Spike (A.VOI.V2)		230	23	AU/mL
SARS-CoV-2 Spike (AY.1)		320	32	AU/mL
SARS-CoV-2 Spike (AY.1) Alt Seq 1		320	32	AU/mL
SARS-CoV-2 Spike (AY.2)		360	36	AU/mL
SARS-CoV-2 Spike (AY.2) Alt Seq 1		300	30	AU/mL

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



CERTIFICATE OF ANALYSIS

SARS-CoV-2 Spike (AY.12)		330	33	AU/mL
SARS-CoV-2 Spike (AY.4.2)		370	37	AU/mL
SARS-CoV-2 Spike (B.1.1.519)		630	63	AU/mL
SARS-CoV-2 Spike (B.1.1.529; BA.1)		59	5.9	AU/mL
SARS-CoV-2 Spike (B.1.1.7)		440	44	AU/mL
SARS-CoV-2 Spike (B.1.1.7+E484K)		310	31	AU/mL
SARS-CoV-2 Spike (B.1.258.17)		770	77	AU/mL
SARS-CoV-2 Spike (B.1.351)		250	25	AU/mL
SARS-CoV-2 Spike (B.1.351.1)		450	45	AU/mL
SARS-CoV-2 Spike (B.1.429)		320	32	AU/mL
SARS-CoV-2 Spike (B.1.466.2)		600	60	AU/mL
SARS-CoV-2 Spike (B.1.525)		300	30	AU/mL
SARS-CoV-2 Spike (B.1.526)		460	46	AU/mL
SARS-CoV-2 Spike (B.1.526.1)		320	32	AU/mL
SARS-CoV-2 Spike (B.1.617)		490	49	AU/mL
SARS-CoV-2 Spike (B.1.617.1)		300	30	AU/mL
SARS-CoV-2 Spike (B.1.617.2)		280	28	AU/mL
SARS-CoV-2 Spike (B.1.617.2 +1)		250	25	AU/mL
SARS-CoV-2 Spike (B.1.617.2 +2)		210	21	AU/mL
SARS-CoV-2 Spike (B.1.617.2 +3)		240	24	AU/mL
SARS-CoV-2 Spike (B.1.617.2 +4)		210	21	AU/mL
SARS-CoV-2 Spike (B.1.617.2; AY.3; AY.5; AY.6; AY.7; AY.14) Alt Seq 1		370	37	AU/mL
SARS-CoV-2 Spike (B.1.617.2; AY.4) Alt Seq 2		400	40	AU/mL
SARS-CoV-2 Spike (B.1.617.2+ ΔY144)		300	30	AU/mL
SARS-CoV-2 Spike (B.1.617.3)		370	37	AU/mL
SARS-CoV-2 Spike (B.1.618)		360	36	AU/mL
SARS-CoV-2 Spike (B.1.620)		170	17	AU/mL
SARS-CoV-2 Spike (B.1.621)		250	25	AU/mL
SARS-CoV-2 Spike (B.1.640.2)		210	21	AU/mL
SARS-CoV-2 Spike (BA.1+L452R)		66	6.6	AU/mL
SARS-CoV-2 Spike (BA.1+R346K)		39	3.9	AU/mL
SARS-CoV-2 Spike (BA.2)		120	12	AU/mL
SARS-CoV-2 Spike (BA.2+L452M)		120	12	AU/mL
SARS-CoV-2 Spike (BA.2+L452R)		100	10	AU/mL
SARS-CoV-2 Spike (BA.2.12.1)		110	11	AU/mL
SARS-CoV-2 Spike (BA.2.75)		57	5.7	AU/mL
SARS-CoV-2 Spike (BA.2.75.2)		52	5.2	AU/mL
SARS-CoV-2 Spike (BA.2.86)		51	5.1	AU/mL
SARS-CoV-2 Spike (BA.3)		43	4.3	AU/mL
SARS-CoV-2 Spike (BA.4)		100	10	AU/mL
SARS-CoV-2 Spike (BA.4.6)		84	8.4	AU/mL
SARS-CoV-2 Spike (BA.5)		110	11	AU/mL
SARS-CoV-2 Spike (BF.7)		80	8.0	AU/mL
SARS-CoV-2 Spike (BN.1)		47	4.7	AU/mL
SARS-CoV-2 Spike (BQ.1)		81	8.1	AU/mL
SARS-CoV-2 Spike (BQ.1.1)		78	7.8	AU/mL
SARS-CoV-2 Spike (BV-1)		330	33	AU/mL
SARS-CoV-2 Spike (C.37)		280	28	AU/mL

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



CERTIFICATE OF ANALYSIS

SARS-CoV-2 Spike (D614G)		830	83	AU/mL
SARS-CoV-2 Spike (EG.5.1)		63	6.3	AU/mL
SARS-CoV-2 Spike (FL.1.5.1)		64	6.4	AU/mL
SARS-CoV-2 Spike (HV.1)		73	7.3	AU/mL
SARS-CoV-2 Spike (JD.1.1)		79	7.9	AU/mL
SARS-CoV-2 Spike (JN.1)		52	5.2	AU/mL
SARS-CoV-2 Spike (P.1)		290	29	AU/mL
SARS-CoV-2 Spike (P.2)		410	41	AU/mL
SARS-CoV-2 Spike (P.3)		130	13	AU/mL
SARS-CoV-2 Spike (R.1)		330	33	AU/mL
SARS-CoV-2 Spike (XBB.1)		54	5.4	AU/mL
SARS-CoV-2 Spike (XBB.1.16)		75	7.5	AU/mL
SARS-CoV-2 Spike (XBB.1.16.1)		60	6	AU/mL
SARS-CoV-2 Spike (XBB.1.16.6)		58	5.8	AU/mL
SARS-CoV-2 Spike (XBB.2.3)		73	7.3	AU/mL
SARS-CoV-2 Spike (XBB.1.5)		51	5.1	AU/mL
Other Coronaviruses				
SARS-CoV-1 Spike		100	10	AU/mL
MERS-CoV Spike		220	22	AU/mL
HCoV-229E Spike		680	68	AU/mL
HCoV-HKU1 Spike		370	37	AU/mL
HCoV-NL63 Spike		81	8.1	AU/mL
HCoV-OC43 Spike		1600	160	AU/mL
Other Respiratory Viruses				
Flu A/Hong Kong/2014 H3		1800	180	AU/mL
Flu A/Michigan/2015 H1		1400	140	AU/mL
Flu A/Shanghai/2013 H7		120	12	AU/mL
Flu B/Brisbane/2008 HA		1700	170	AU/mL
Flu B/Phuket/2013 HA		2400	240	AU/mL
Flu A/Wisconsin/2019 H1		950	95	AU/mL
Flu A/Darwin/2021 H3		580	58	AU/mL
Flu B/Austria/2021 HA		920	92	AU/mL
RSV Pre-Fusion F		3100	310	AU/mL

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



CERTIFICATE OF ANALYSIS

Concentration Assignment of IgM Antibodies:

IgM: Use as viald for all plate types

Assay	Alternate Name	Conc. of IgM (viald)	Unit of Measure
SARS-CoV-2			
SARS-CoV-2 Nucleocapsid		49	AU/mL
SARS-CoV-2 S1 NTD		4.6	AU/mL
SARS-CoV-2 S1 RBD		98	AU/mL
SARS-CoV-2 Spike		130	AU/mL
SARS-CoV-2 S1 RBD (A.23.1)	V367F	110	AU/mL
SARS-CoV-2 S1 RBD (A.VO1.V2)	R346K, T478R, E484K	25	AU/mL
SARS-CoV-2 S1 RBD (AY.1)	K417N, L452R, T478K	100	AU/mL
SARS-CoV-2 S1 RBD (AY.2)	K417N, L452R, T478K	100	AU/mL
SARS-CoV-2 S1 RBD (AY.3)	L452R, T478K; RBD (Delta)	100	AU/mL
SARS-CoV-2 S1 RBD (AY.4)	L452R, T478K; RBD (Delta)	100	AU/mL
SARS-CoV-2 S1 RBD (AY.4.2)	L452R, T478K; RBD (Delta)	100	AU/mL
SARS-CoV-2 S1 RBD (AY.5)	L452R, T478K; RBD (Delta)	100	AU/mL
SARS-CoV-2 S1 RBD (AY.6)	L452R, T478K; RBD (Delta)	100	AU/mL
SARS-CoV-2 S1 RBD (AY.7)	L452R, T478K; RBD (Delta)	100	AU/mL
SARS-CoV-2 S1 RBD (AY.12)	L452R, T478K; RBD (Delta)	100	AU/mL
SARS-CoV-2 S1 RBD (AY.14)	L452R, T478K; RBD (Delta)	100	AU/mL
SARS-CoV-2 S1 RBD (B.1.1.519)	T478K	69	AU/mL
SARS-CoV-2 S1 RBD (B.1.1.529; BA.1)	RBD (Omicron; BA.1)	4.1	AU/mL
SARS-CoV-2 S1 RBD (B.1.1.7)	N501Y; RBD (Alpha)	49	AU/mL
SARS-CoV-2 S1 RBD (B.1.1.7+E484K)	E484K, N501Y	24	AU/mL
SARS-CoV-2 S1 RBD (B.1.214.2)	Q414K, N450K	62	AU/mL
SARS-CoV-2 S1 RBD (B.1.258.17)	N439K	60	AU/mL
SARS-CoV-2 S1 RBD (B.1.351)	K417N, E484K, N501Y; RBD (Beta)	18	AU/mL
SARS-CoV-2 S1 RBD (B.1.351.1)	K417N, E484K, N501Y; RBD (Beta)	18	AU/mL
SARS-CoV-2 S1 RBD (B.1.427)	L452R	64	AU/mL
SARS-CoV-2 S1 RBD (B.1.429)	L452R	64	AU/mL
SARS-CoV-2 S1 RBD (B.1.466.2)	N439K	60	AU/mL
SARS-CoV-2 S1 RBD (B.1.525)	E484K	32	AU/mL
SARS-CoV-2 S1 RBD (B.1.526)	E484K	32	AU/mL
SARS-CoV-2 S1 RBD (B.1.526.1)	L452R	64	AU/mL
SARS-CoV-2 S1 RBD (B.1.526.2)	S477N	87	AU/mL
SARS-CoV-2 S1 RBD (B.1.617)	L452R, E484Q	38	AU/mL
SARS-CoV-2 S1 RBD (B.1.617.1)	L452R, E484Q	38	AU/mL
SARS-CoV-2 S1 RBD (B.1.617.2)	L452R, T478K; RBD (Delta)	100	AU/mL
SARS-CoV-2 S1 RBD (B.1.617.2+ΔY144)	L452R, T478K; RBD (Delta)	100	AU/mL
SARS-CoV-2 S1 RBD (B.1.617.3)	L452R, E484Q	38	AU/mL
SARS-CoV-2 S1 RBD (B.1.618)	E484K	32	AU/mL
SARS-CoV-2 S1 RBD (B.1.620)	S477N, E484K	35	AU/mL
SARS-CoV-2 S1 RBD (BA.1.1)	RBD (Omicron; BA.1.1)	3.3	AU/mL
SARS-CoV-2 S1 RBD (BA.2)	RBD (Omicron; BA.2)	7.2	AU/mL
SARS-CoV-2 S1 RBD (BA.2+L452M)	RBD (BA.2+L452M)	6.3	AU/mL
SARS-CoV-2 S1 RBD (BA.2+L452R)	RBD (BA.2+L452R)	6.7	AU/mL

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



CERTIFICATE OF ANALYSIS

SARS-CoV-2 S1 RBD (BA.2.12.1)	RBD (BA.2.12.1)	7.7	AU/mL
SARS-CoV-2 S1 RBD (BA.2.75)	RBD (BA.2.75)	5.6	AU/mL
SARS-CoV-2 S1 RBD (BA.2.75.2)	RBD (BA.2.75.2)	6.6	AU/mL
SARS-CoV-2 S1 RBD (BA.3)	RBD (BA.3)	4.0	AU/mL
SARS-CoV-2 S1 RBD (BA.4; BA.5)	RBD (BA.4; BA.5)	15	AU/mL
SARS-CoV-2 S1 RBD (BA.4.6; BF.7)	RBD (BA.4.6; BF.7)	10	AU/mL
SARS-CoV-2 S1 RBD (BQ.1)	RBD (BQ.1)	4.5	AU/mL
SARS-CoV-2 S1 RBD (BQ.1.1)	RBD (BQ.1.1)	7.3	AU/mL
SARS-CoV-2 S1 RBD (BV-1)	Q493R, N501Y	60	AU/mL
SARS-CoV-2 S1 RBD (C.37)	L452Q, F490S	25	AU/mL
SARS-CoV-2 S1 RBD (P.1)	K417T, E484K, N501Y; RBD (Gamma)	NA	AU/mL
SARS-CoV-2 S1 RBD (P.2)	E484K	32	AU/mL
SARS-CoV-2 S1 RBD (P.3)	E484K, N501Y	24	AU/mL
SARS-CoV-2 S1 RBD (R.1)	E484K	32	AU/mL
SARS-CoV-2 S1 RBD (XBB.1)	RBD (XBB.1)	5.3	AU/mL
SARS-CoV-2 Spike (A.23.1)		150	AU/mL
SARS-CoV-2 Spike (A.VOL.V2)		42	AU/mL
SARS-CoV-2 Spike (AY.1)		86	AU/mL
SARS-CoV-2 Spike (AY.1) Alt Seq 1		98	AU/mL
SARS-CoV-2 Spike (AY.2)		110	AU/mL
SARS-CoV-2 Spike (AY.2) Alt Seq 1		84	AU/mL
SARS-CoV-2 Spike (AY.12)		85	AU/mL
SARS-CoV-2 Spike (AY.4.2)		120	AU/mL
SARS-CoV-2 Spike (B.1.1.519)		110	AU/mL
SARS-CoV-2 Spike (B.1.1.529; BA.1)		7.2	AU/mL
SARS-CoV-2 Spike (B.1.1.7)		87	AU/mL
SARS-CoV-2 Spike (B.1.1.7+E484K)		57	AU/mL
SARS-CoV-2 Spike (B.1.258.17)		150	AU/mL
SARS-CoV-2 Spike (B.1.351)		29	AU/mL
SARS-CoV-2 Spike (B.1.351.1)		93	AU/mL
SARS-CoV-2 Spike (B.1.429)		100	AU/mL
SARS-CoV-2 Spike (B.1.466.2)		120	AU/mL
SARS-CoV-2 Spike (B.1.525)		57	AU/mL
SARS-CoV-2 Spike (B.1.526)		76	AU/mL
SARS-CoV-2 Spike (B.1.526.1)		120	AU/mL
SARS-CoV-2 Spike (B.1.617)		72	AU/mL
SARS-CoV-2 Spike (B.1.617.1)		45	AU/mL
SARS-CoV-2 Spike (B.1.617.2)		100	AU/mL
SARS-CoV-2 Spike (B.1.617.2 +1)		34	AU/mL
SARS-CoV-2 Spike (B.1.617.2 +2)		29	AU/mL
SARS-CoV-2 Spike (B.1.617.2 +3)		40	AU/mL
SARS-CoV-2 Spike (B.1.617.2 +4)		30	AU/mL
SARS-CoV-2 Spike (B.1.617.2; AY.3; AY.5; AY.6; AY.7; AY.14) Alt Seq 1		120	AU/mL
SARS-CoV-2 Spike (B.1.617.2; AY.4) Alt Seq 2		140	AU/mL
SARS-CoV-2 Spike (B.1.617.2+ ΔY144)		100	AU/mL
SARS-CoV-2 Spike (B.1.617.3)		56	AU/mL
SARS-CoV-2 Spike (B.1.618)		53	AU/mL

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



CERTIFICATE OF ANALYSIS

SARS-CoV-2 Spike (B.1.620)		31	AU/mL
SARS-CoV-2 Spike (B.1.621)		43	AU/mL
SARS-CoV-2 Spike (B.1.640.2)		61	AU/mL
SARS-CoV-2 Spike (BA.1+L452R)		15	AU/mL
SARS-CoV-2 Spike (BA.1+R346K)		10	AU/mL
SARS-CoV-2 Spike (BA.2)		27	AU/mL
SARS-CoV-2 Spike (BA.2+L452M)		25	AU/mL
SARS-CoV-2 Spike (BA.2+L452R)		25	AU/mL
SARS-CoV-2 Spike (BA.2.12.1)		27	AU/mL
SARS-CoV-2 Spike (BA.2.75)		8.8	AU/mL
SARS-CoV-2 Spike (BA.2.75.2)		7.9	AU/mL
SARS-CoV-2 Spike (BA.3)		9.5	AU/mL
SARS-CoV-2 Spike (BA.4)		29	AU/mL
SARS-CoV-2 Spike (BA.4.6)		24	AU/mL
SARS-CoV-2 Spike (BA.5)		34	AU/mL
SARS-CoV-2 Spike (BF.7)		20	AU/mL
SARS-CoV-2 Spike (BN.1)		6.9	AU/mL
SARS-CoV-2 Spike (BQ.1)		18	AU/mL
SARS-CoV-2 Spike (BQ.1.1)		17	AU/mL
SARS-CoV-2 Spike (BV-1)		60	AU/mL
SARS-CoV-2 Spike (C.37)		57	AU/mL
SARS-CoV-2 Spike (D614G)		140	AU/mL
SARS-CoV-2 Spike (P.1)		53	AU/mL
SARS-CoV-2 Spike (P.2)		61	AU/mL
SARS-CoV-2 Spike (P.3)		20	AU/mL
SARS-CoV-2 Spike (R.1)		41	AU/mL
SARS-CoV-2 Spike (XBB.1)		6.4	AU/mL
SARS-CoV-2 Spike (XBB.1.5)		5.3	AU/mL
Other Coronaviruses			
SARS-CoV-1 Spike		4.5	AU/mL
MERS-CoV Spike		3.7	AU/mL
HCoV-229E Spike		1.9	AU/mL
HCoV-HKU1 Spike		8.6	AU/mL
HCoV-NL63 Spike		NA	AU/mL
HCoV-OC43 Spike		3.6	AU/mL
Other Respiratory Viruses			
Flu A/Hong Kong/2014 H3		0.69	AU/mL
Flu A/Michigan/2015 H1		8.1	AU/mL
Flu A/Shanghai/2013 H7		2.1	AU/mL
Flu B/Brisbane/2008 HA		28	AU/mL
Flu B/Phuket/2013 HA		42	AU/mL
RSV Pre-Fusion F		8.0	AU/mL

NA - Not Assigned

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



CERTIFICATE OF ANALYSIS

IgA: Use at 1:10 for Respiratory Plate 1;
Use as viald for all other plate types

Concentration Assignment of IgA Antibodies:

Assay	Alternate Name	Conc. of IgA (viald)	Conc. of IgA (1:10)	Unit of Measure
SARS-CoV-2				
SARS-CoV-2 Nucleocapsid		110	11	AU/mL
SARS-CoV-2 S1 NTD		15	1.5	AU/mL
SARS-CoV-2 S1 RBD		60	6.0	AU/mL
SARS-CoV-2 Spike		87	8.7	AU/mL
SARS-CoV-2 S1 RBD (A.23.1)	V367F	72	7.2	AU/mL
SARS-CoV-2 S1 RBD (A.VOI.V2)	R346K, T478R, E484K	12	1.2	AU/mL
SARS-CoV-2 S1 RBD (AY.1)	K417N, L452R, T478K	38	3.8	AU/mL
SARS-CoV-2 S1 RBD (AY.2)	K417N, L452R, T478K	38	3.8	AU/mL
SARS-CoV-2 S1 RBD (AY.3)	L452R, T478K; RBD (Delta)	37	3.7	AU/mL
SARS-CoV-2 S1 RBD (AY.4)	L452R, T478K; RBD (Delta)	37	3.7	AU/mL
SARS-CoV-2 S1 RBD (AY.4.2)	L452R, T478K; RBD (Delta)	37	3.7	AU/mL
SARS-CoV-2 S1 RBD (AY.5)	L452R, T478K; RBD (Delta)	37	3.7	AU/mL
SARS-CoV-2 S1 RBD (AY.6)	L452R, T478K; RBD (Delta)	37	3.7	AU/mL
SARS-CoV-2 S1 RBD (AY.7)	L452R, T478K; RBD (Delta)	37	3.7	AU/mL
SARS-CoV-2 S1 RBD (AY.12)	L452R, T478K; RBD (Delta)	37	3.7	AU/mL
SARS-CoV-2 S1 RBD (AY.14)	L452R, T478K; RBD (Delta)	37	3.7	AU/mL
SARS-CoV-2 S1 RBD (B.1.1.519)	T478K	49	4.9	AU/mL
SARS-CoV-2 S1 RBD (B.1.1.529; BA.1)	RBD (Omicron; BA.1)	3.3	0.33	AU/mL
SARS-CoV-2 S1 RBD (B.1.1.7)	N501Y; RBD (Alpha)	43	4.3	AU/mL
SARS-CoV-2 S1 RBD (B.1.1.7+E484K)	E484K, N501Y	8.8	0.88	AU/mL
SARS-CoV-2 S1 RBD (B.1.214.2)	Q414K, N450K	26	2.6	AU/mL
SARS-CoV-2 S1 RBD (B.1.258.17)	N439K	25	2.5	AU/mL
SARS-CoV-2 S1 RBD (B.1.351)	K417N, E484K, N501Y; RBD (Beta)	6.2	0.62	AU/mL
SARS-CoV-2 S1 RBD (B.1.351.1)	K417N, E484K, N501Y; RBD (Beta)	6.2	0.62	AU/mL
SARS-CoV-2 S1 RBD (B.1.427)	L452R	33	3.3	AU/mL
SARS-CoV-2 S1 RBD (B.1.429)	L452R	33	3.3	AU/mL
SARS-CoV-2 S1 RBD (B.1.466.2)	N439K	25	2.5	AU/mL
SARS-CoV-2 S1 RBD (B.1.525)	E484K	11	1.1	AU/mL
SARS-CoV-2 S1 RBD (B.1.526)	E484K	11	1.1	AU/mL
SARS-CoV-2 S1 RBD (B.1.526.1)	L452R	33	3.3	AU/mL
SARS-CoV-2 S1 RBD (B.1.526.2)	S477N	58	5.8	AU/mL
SARS-CoV-2 S1 RBD (B.1.617)	L452R, E484Q	22	2.2	AU/mL
SARS-CoV-2 S1 RBD (B.1.617.1)	L452R, E484Q	22	2.2	AU/mL
SARS-CoV-2 S1 RBD (B.1.617.2)	L452R, T478K; RBD (Delta)	37	3.7	AU/mL
SARS-CoV-2 S1 RBD (B.1.617.2+ΔY144)	L452R, T478K; RBD (Delta)	37	3.7	AU/mL
SARS-CoV-2 S1 RBD (B.1.617.3)	L452R, E484Q	22	2.2	AU/mL
SARS-CoV-2 S1 RBD (B.1.618)	E484K	11	1.1	AU/mL
SARS-CoV-2 S1 RBD (B.1.620)	S477N, E484K	11	1.1	AU/mL
SARS-CoV-2 S1 RBD (B.1.621)	S477N, E484K	12	1.2	AU/mL
SARS-CoV-2 S1 RBD (BA.1.1)	RBD (Omicron; BA.1.1)	2.6	0.26	AU/mL
SARS-CoV-2 S1 RBD (BA.2)	RBD (Omicron; BA.2)	5.0	0.5	AU/mL

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



CERTIFICATE OF ANALYSIS

SARS-CoV-2 S1 RBD (BA.2+L452M)	RBD (BA.2+L452M)	4.2	0.42	AU/mL
SARS-CoV-2 S1 RBD (BA.2+L452R)	RBD (BA.2+L452R)	3.9	0.39	AU/mL
SARS-CoV-2 S1 RBD (BA.2.12.1)	RBD (BA.2.12.1)	4.5	0.45	AU/mL
SARS-CoV-2 S1 RBD (BA.2.75)	RBD (BA.2.75)	3.7	0.37	AU/mL
SARS-CoV-2 S1 RBD (BA.2.75.2)	RBD (BA.2.75.2)	2.5	0.25	AU/mL
SARS-CoV-2 S1 RBD (BA.3)	RBD (BA.3)	3.0	0.3	AU/mL
SARS-CoV-2 S1 RBD (BA.4; BA.5)	RBD (BA.4; BA.5)	4.7	0.47	AU/mL
SARS-CoV-2 S1 RBD (BA.4.6; BF.7)	RBD (BA.4.6; BF.7)	4.1	0.41	AU/mL
SARS-CoV-2 S1 RBD (BQ.1)	RBD (BQ.1)	3.5	0.35	AU/mL
SARS-CoV-2 S1 RBD (BQ.1.1)	RBD (BQ.1.1)	3.5	0.35	AU/mL
SARS-CoV-2 S1 RBD (BV-1)	Q493R, N501Y	40	4.0	AU/mL
SARS-CoV-2 S1 RBD (C.37)	L452Q, F490S	25	2.5	AU/mL
SARS-CoV-2 S1 RBD (P.1)	K417T, E484K, N501Y; RBD (Gamma)	11	1.1	AU/mL
SARS-CoV-2 S1 RBD (P.2)	E484K	11	1.1	AU/mL
SARS-CoV-2 S1 RBD (P.3)	E484K, N501Y	8.8	0.88	AU/mL
SARS-CoV-2 S1 RBD (R.1)	E484K	11	1.1	AU/mL
SARS-CoV-2 S1 RBD (XBB.1)	RBD (XBB.1)	2.6	0.26	AU/mL
SARS-CoV-2 Spike (A.23.1)		100	10	AU/mL
SARS-CoV-2 Spike (A.VOL.V2)		41	4.1	AU/mL
SARS-CoV-2 Spike (AY.1)		55	5.5	AU/mL
SARS-CoV-2 Spike (AY.1) Alt Seq 1		55	5.5	AU/mL
SARS-CoV-2 Spike (AY.2)		64	6.4	AU/mL
SARS-CoV-2 Spike (AY.2) Alt Seq 1		49	4.9	AU/mL
SARS-CoV-2 Spike (AY.12)		51	5.1	AU/mL
SARS-CoV-2 Spike (AY.4.2)		58	5.8	AU/mL
SARS-CoV-2 Spike (B.1.1.519)		76	7.6	AU/mL
SARS-CoV-2 Spike (B.1.1.529; BA.1)		13	1.3	AU/mL
SARS-CoV-2 Spike (B.1.1.7)		62	6.2	AU/mL
SARS-CoV-2 Spike (B.1.1.7+E484K)		60	6.00	AU/mL
SARS-CoV-2 Spike (B.1.258.17)		100	10	AU/mL
SARS-CoV-2 Spike (B.1.351)		36	3.6	AU/mL
SARS-CoV-2 Spike (B.1.351.1)		62	6.2	AU/mL
SARS-CoV-2 Spike (B.1.429)		57	5.7	AU/mL
SARS-CoV-2 Spike (B.1.466.2)		85	8.5	AU/mL
SARS-CoV-2 Spike (B.1.525)		51	5.1	AU/mL
SARS-CoV-2 Spike (B.1.526)		60	6.00	AU/mL
SARS-CoV-2 Spike (B.1.526.1)		62	6.2	AU/mL
SARS-CoV-2 Spike (B.1.617)		73	7.3	AU/mL
SARS-CoV-2 Spike (B.1.617.1)		44	4.4	AU/mL
SARS-CoV-2 Spike (B.1.617.2)		50	5.0	AU/mL
SARS-CoV-2 Spike (B.1.617.2 +1)		38	3.8	AU/mL
SARS-CoV-2 Spike (B.1.617.2 +2)		33	3.3	AU/mL
SARS-CoV-2 Spike (B.1.617.2 +3)		40	4.0	AU/mL
SARS-CoV-2 Spike (B.1.617.2 +4)		33	3.3	AU/mL
SARS-CoV-2 Spike (B.1.617.2; AY.3; AY.5; AY.6; AY.7; AY.14) Alt Seq 1		63	6.3	AU/mL
SARS-CoV-2 Spike (B.1.617.2; AY.4) Alt Seq 2		68	6.8	AU/mL
SARS-CoV-2 Spike (B.1.617.2+ ΔY144)		53	5.3	AU/mL

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



CERTIFICATE OF ANALYSIS

SARS-CoV-2 Spike (B.1.617.3)		52	5.2	AU/mL
SARS-CoV-2 Spike (B.1.618)		59	5.9	AU/mL
SARS-CoV-2 Spike (B.1.620)		32	3.2	AU/mL
SARS-CoV-2 Spike (B.1.621)		39	3.9	AU/mL
SARS-CoV-2 Spike (B.1.640.2)		26	2.6	AU/mL
SARS-CoV-2 Spike (BA.1+L452R)		6.8	0.68	AU/mL
SARS-CoV-2 Spike (BA.1+R346K)		4	0.4	AU/mL
SARS-CoV-2 Spike (BA.2)		18	1.8	AU/mL
SARS-CoV-2 Spike (BA.2+L452M)		17	1.7	AU/mL
SARS-CoV-2 Spike (BA.2+L452R)		14	1.4	AU/mL
SARS-CoV-2 Spike (BA.2.12.1)		17	1.7	AU/mL
SARS-CoV-2 Spike (BA.2.75)		11	1.1	AU/mL
SARS-CoV-2 Spike (BA.2.75.2)		11	1.1	AU/mL
SARS-CoV-2 Spike (BA.2.86)		11	1.1	AU/mL
SARS-CoV-2 Spike (BA.3)		4.5	0.45	AU/mL
SARS-CoV-2 Spike (BA.4)		15	1.5	AU/mL
SARS-CoV-2 Spike (BA.4.6)		13	1.3	AU/mL
SARS-CoV-2 Spike (BA.5)		17	1.7	AU/mL
SARS-CoV-2 Spike (BF.7)		14	1.4	AU/mL
SARS-CoV-2 Spike (BN.1)		NA	NA	AU/mL
SARS-CoV-2 Spike (BQ.1)		12	1.2	AU/mL
SARS-CoV-2 Spike (BQ.1.1)		12	1.2	AU/mL
SARS-CoV-2 Spike (BV-1)		55	5.5	AU/mL
SARS-CoV-2 Spike (C.37)		41	4.1	AU/mL
SARS-CoV-2 Spike (D614G)		98	9.8	AU/mL
SARS-CoV-2 Spike (EG.5.1)		12	1.2	AU/mL
SARS-CoV-2 Spike (FL.1.5.1)		13	1.3	AU/mL
SARS-CoV-2 Spike (HV.1)		11	1.1	AU/mL
SARS-CoV-2 Spike (JD.1.1)		12	1.2	AU/mL
SARS-CoV-2 Spike (JN.1)		9.5	0.95	AU/mL
SARS-CoV-2 Spike (P.1)		44	4.4	AU/mL
SARS-CoV-2 Spike (P.2)		55	5.5	AU/mL
SARS-CoV-2 Spike (P.3)		22	2.2	AU/mL
SARS-CoV-2 Spike (R.1)		46	4.6	AU/mL
SARS-CoV-2 Spike (XBB.1)		10	1.0	AU/mL
SARS-CoV-2 Spike (XBB.1.5)		10	1.0	AU/mL
Other Coronaviruses				
SARS-CoV-1 Spike		20	2.0	AU/mL
MERS-CoV Spike		51	5.1	AU/mL
HCoV-229E Spike		74	7.4	AU/mL
HCoV-HKU1 Spike		100	10	AU/mL
HCoV-NL63 Spike		35	3.5	AU/mL
HCoV-OC43 Spike		260	26	AU/mL

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



CERTIFICATE OF ANALYSIS

Other Respiratory Viruses				
Flu A/Hong Kong/2014 H3		110	11	AU/mL
Flu A/Michigan/2015 H1		160	16	AU/mL
Flu A/Shanghai/2013 H7		36	3.6	AU/mL
Flu B/Brisbane/2008 HA		320	32	AU/mL
Flu B/Phuket/2013 HA		400	40	AU/mL
RSV Pre-Fusion F		430	43	AU/mL

NA - Not Assigned

This product was manufactured and tested according to MSD documents. This lot meets MSD’s specifications.
 This product is intended for Research Use Only. Not for use in Diagnostic Procedures.

	Name	Function	Signature	Date
Review/Approval	Karen Hamilla	Quality		06 MAY 2024

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